Record of Decision

Operable Unit 1 (Soils) Omega Chemical Corporation Superfund Site Whittier, California

United States Environmental Protection Agency
Region 9 – San Francisco, California

September 2008

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Acronyms and Abbreviations

(mg/kg-day)	milligram of chemical per kilogram of body weight per day
ARAR	applicable or relevant and appropriate requirement
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by Superfund Amendments and Reauthorization Act of 1986
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
COPC	constituents of potential concern
CSF	cancer slope factor
DCE	dichloroethene
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DHS	Department of Health Services
DNAPL	dense nonaqueous-phase liquid
DPE	dual-phase extraction
DTSC	California Department of Toxic Substances Control
EE/CA	Engineering Evaluation/Cost Analysis
EPA	United States Environmental Protection Agency
ERH	electrical resistive heating
FS	feasibility study
GAC	granular activated carbon
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient

HVAC	heating, ventilating, and air conditioning
IC	Institutional Control
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MIP	membrane-interface probe
msl	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOV	Notice of Violation
NPL	National Priorities List
Omega	Omega Chemical Corporation
Omega Site	Omega Chemical Corporation Superfund Site
OPOG	Omega Chemical Site PRP Organized Group
OU	Operable Unit
OU-1	Operable Unit One
OU-2	Operable Unit Two
PAH	polynuclear aromatic hydrocarbon
Partial CD	Partial Consent Decree
PCB	polychlorinated biphenyl
PCE	Tetrachloroethene
PPE	personal protective equipment
PRG	preliminary remediation goal
PRP	potentially responsible party
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RFI	Resource Conservation and Recovery Act Facility Investigation
RI	remedial investigation
RI/FS	Remedial Investigation/Feasibility Study

ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SCAQMD	South Coast Air Quality Management District
SLERA	Screening-Level Ecological Risk Assessment
SSD	sub-slab depressurization
SVE	soil vapor extraction
SVOC	semi-volatile organic compound
TAT	Technical Assistance Team
TBC	to-be-considered
TCA	trichloroethane
TCE	trichloroethene
TDS	total dissolved solids
UAO	Unilateral Administrative Order
UST	underground storage tank
VOC	volatile organic compound

1.0 Part 1: The Declaration

1.1 Site Name and Location

Omega Chemical Corporation Superfund Site – Operable Unit 1 (Soils)
12504 and 12512 Whittier Boulevard
City of Whittier, Los Angeles County, California 90602
CERCLIS Identification Number CAD042245001

1.2 Statement of Basis and Purpose

This decision document presents the selected remedy for the Operable Unit One (OU-1) vadose zone soils (i.e., soils between the ground surface and the water table) at the Omega Chemical Corporation Superfund Site (Omega Site) in Whittier, California. This remedy for the Omega Site was chosen by the United States Environmental Protection Agency (EPA) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA) (collectively referred to herein as CERCLA) and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record file for Omega Site OU-1.

The State of California, acting through the California Department of Toxic Substances Control (DTSC), concurs with the selected remedy.

1.3 Assessment of OU-1

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances and pollutants or contaminants from the Omega Site OU-1 vadose zone soils, which could present an imminent and substantial endangerment to public health or welfare.

1.4 Description of Selected Remedy

The former Omega Chemical Corporation (Omega) property is located at 12504/12512 East Whittier Boulevard in Whittier, California. OU-1 at the Omega Site is an area encompassing the former Omega Property and extending about 100 feet southwest across Putnam Street. OU-2 is defined as the downgradient extent of groundwater contamination above screening levels that originated from the former Omega property, as well as any commingled contamination released from other sites. The Remedial Investigation (RI) and Feasibility Study (FS) for OU-2 are on-going; the RI report is expected to be released to the public in 2008 and the FS report in 2009. The overall cleanup strategy for the Omega Site consists of a non-time-critical removal action to contain the highly contaminated groundwater in OU-1 (currently in the construction stage), followed by a remedial action for the OU-1 source area (i.e., the remedy described herein) and a site-wide groundwater remedy that may include targeted source cleanup actions within OU-2.

The remedial action for Omega Site OU-1 vadose zone soils addresses contaminated soil and soil vapor. To remove the potential threat to human health, the selected remedy will use soil vapor extraction (SVE) followed by carbon filters to remove and treat volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) present in the OU-1 soils at the Omega Site.

Contingencies for increasing the effectiveness of SVE, including hot air injection and dual-phase extraction (DPE), will be implemented if necessary to meet the cleanup levels. Institutional controls will be used to maintain paved areas and to place restrictions on excavation during operation of the SVE system. To the extent reasonably practicable, these will be implemented either through land use covenants negotiated with the landowners, which will run with the land or, in the event that such negotiations are not successful, through a sufficient alternative, such as municipal restrictions or special building or other permit restrictions imposed by the municipal authority in this area, or some combination thereof. It is expected that appropriate ICs will remain in place until such time as EPA deems the OU-1 soil remedy complete.

The OU-1 vadose zone soils remedy will reduce or eliminate human health risks presented by the contamination and will reduce or eliminate contaminant migration to groundwater. The latter will complement the OU-1 groundwater containment remedy currently being implemented through a non-time-critical removal action. The removal action consists of a groundwater pump-and-treat system to contain the highest levels of contamination within OU-1.

Dense nonaqueous-phase liquid (DNAPL) is assumed to be present in the subsurface within the OU-1 area based on the concentrations of soluble VOCs in groundwater. The highest levels of VOC contamination in soils, suggesting the presence of DNAPL, were found at the interface with the water table (capillary fringe). Small quantities of DNAPL may also be present in the soils above the water table. The investigation results suggest that no continuous pool of DNAPL is present at OU-1. The selected OU-1 vadose zone soils remedy will be capable of removing DNAPL from the vadose zone by volatilization and extraction of contaminant vapors.

Although DNAPL presence has not been directly confirmed, the contaminated soil constitutes a principal threat waste because of the high mobility of VOC vapors and high calculated risk to future residents.

The major components of the selected remedy include the following actions:

- The SVE component will include installation and operation of extraction wells, which remove contaminated soil vapor and pipe it to a treatment system, which will likely be constructed on the former Skateland property (adjacent to the former Omega property).
- Soil vapors will be treated by passing them through granular activated carbon (GAC) to remove contaminants so that the treated air complies with the limits specified by the South Coast Air Quality Management District (SCAQMD) before being released to the atmosphere.

- Hot air injection and/or DPE will be implemented if cleanup levels are not achieved through SVE alone. Hot air injection and/or DPE would be used if sampling data indicate that SVE alone is unable to reduce contaminant levels in soil gas to below the cleanup levels. DPE would also be used to prevent water table rise, if necessary.
- Condensate from the SVE system and water generated from DPE (if implemented) would be pumped to the groundwater treatment system on the former Skateland property.
- Institutional controls will be used to maintain paved areas within the OU-1 area and to place restrictions on excavation during operation of the SVE system.
- Monitoring will be conducted to evaluate the effectiveness of the remedy.

1.5 Statutory Determination

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

This remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

Because this remedy is expected to take longer than 5 years to attain remedial action objectives (RAOs) and cleanup levels, a review will be conducted within 5 years after initiation of the remedial action for Omega Site OU-1 to ensure that the remedy is, or will be, protective of human health and the environment.

1.6 ROD Data Certification Checklist

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record file for Omega Site OU-1.

- Chemicals of concern and their respective concentrations – Page 2-10;
- Baseline risk represented by the chemicals of concern – Page 2-15;
- Cleanup levels established for chemicals of concern and the basis for these levels – Page 2-19;
- How source materials constituting principal threats are addressed – Page 2-27;
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the baseline risk assessment and ROD – Page 2-13;
- Potential land and ground water use that will be available at the site as a result of the Selected Remedy – Page 2-29;

- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and number of years over which the remedy cost estimates are projected – Page 2-29; and
- Key factor(s) that led to selecting the remedy (i.e., describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) – Page 2-27.

1.7 Authorizing Signature

Kathleen Salyer

Kathleen Salyer, Assistant Director
Superfund Division
California Site Cleanup Branch
U.S. Environmental Protection Agency, Region 9

9/30/08
Date

2.0 Part 2: The Decision Summary

2.1 Site Name, Location and Brief Description

The Omega Chemical Corporation Superfund Site (Omega Site) is located in Whittier, California (see Figure 1). EPA has divided the Omega Site into three Operable Units (OUs). OU-1 (Figure 2) includes soil and groundwater contamination on and near the former Omega facility property, extending approximately 100 feet southwest of Putnam Street. OU-2 (Figure 1) is the contamination in groundwater that originated from the former Omega facility and is downgradient of OU-1. OU-3 includes the indoor air contamination that has been documented within OU-1.

The former Omega Chemical Corporation (Omega) property is located at 12504/12512 East Whittier Boulevard in Whittier, California. It occupies Los Angeles County Assessor Tract Number 13486, Lots 3 and 4. The former Omega property is approximately 41,000 square feet in area and contains two structures, a warehouse and an office building. A loading dock is attached to the rear of the warehouse. The exterior areas are concrete paved, and the former Omega property is secured with a perimeter fence and locking gate. The identification number for the Omega Site in the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) is CAD042245001.

Omega was a solvent and refrigerant recycling operation located in Whittier, California, a community of approximately 85,000 people. The former Omega facility was located at 12504 and 12512 Whittier Boulevard (two adjoining parcels), across the street from a residential neighborhood and within 1 mile of several schools, including three elementary schools and two high schools. The facility operated as a solvent and refrigerant recycling and treatment facility from approximately 1976 to 1991, handling primarily chlorinated hydrocarbons and chlorofluorocarbons. Drums and bulk loads of waste solvents and chemicals from various industrial activities were processed at Omega to form commercial products. Chemical, thermal, and physical treatment processes were reportedly used to recycle the waste materials. Wastes generated from treatment and recycling activities included still bottoms resulting from the distillation of spent solvents, aqueous fractions, and nonrecoverable solvents.

EPA is the lead agency for the Omega Site. The California Department of Toxic Substances Control (DTSC) is the lead state agency. Currently, the expected source of cleanup monies for the Omega Site OU-1 vadose zone soils remedy is the group of potentially responsible parties that sent waste to Omega during its period of operation.

2.2 Site History and Enforcement Activities

2.2.1 Site History

Two separate parcels and street addresses comprise the property of the former Omega facility (i.e., 12504 and 12512 Whittier Boulevard). From 1951 to 1963, Sierra Bullets, Inc. and various related entities that manufactured bullets owned the 12504 Whittier Boulevard property. Before construction of the buildings in 1955, this property was used for agriculture.

Fred R. Rippy, Inc. purchased the parcel at 12504 Whittier Boulevard in 1963 and sold it to Omega in 1987. From 1963 to 1966, Rippy operated a machine shop and then leased the facility to the following tenants, in chronological order:

- Accessory Products Company (dry good warehousing) (1966 to 1967)
- Maples Bros. Inc. (wood furniture manufacturer) (1967 to 1970)
- Stoner Western Company (ambulance manufacturer) (1970 to 1974)
- Bachelor Chemical Company (chemical recycler) (1974 to 1976)
- Omega Chemical Corporation (1976 to 1987)

From 1976 to 1987, Omega leased 12504 Whittier Boulevard for operation of a recycling and treatment facility for commercial and industrial solid and liquid wastes, and a transfer station for storage and consolidation of wastes for shipment to other treatment and/or disposal facilities. In 1987, Omega purchased the property it was leasing at 12504 Whittier Boulevard and expanded operations onto the 12512 Whittier Boulevard property.

The parcel at 12512 Whittier Boulevard was used for agriculture up until 1951, when the property was first sold for development. Between 1951 and 1984, the property was purchased and sold several times. It is not known how the property was used during this period. In 1984, the property was purchased by Fred R. Rippy, Inc., who sold it to Omega in 1987. During the period from 1984 to 1987, tenants at the property were Earthly Endeavors, which made handcrafted clay products, and the ANB Construction Company.

Omega ceased operating in 1991, but its president, Dennis O'Meara, continued to operate at the two parcels under a different company name until 1995 on a more limited basis. Subsequent to 1991, the new company primarily accepted Freons. O'Meara owned both parcels until they were foreclosed upon in 2003. Between 1995 and 2003, the two properties were occupied by various tenants.

The Omega Site was placed on the National Priorities List (NPL) in January 1999 (64 Fed. Reg. 2942).

Van Owen Holdings LLC (Van Owen) of Los Angeles, California, purchased the former Omega property (12504 and 12512 Whittier Boulevard) in 2003. Currently, Star City Auto Body occupies the warehouse (12504 Whittier Boulevard) and performs auto body repair and painting. Star City also leases the small paved parking lot north of the warehouse building for automobile parking. Three Kings Construction occupied the former administrative building (12512 Whittier Boulevard) and larger paved parking area south of the warehouse from 2004 until 2006.

2.2.2 Previous Investigations and Enforcement Activities

2.2.2.1 Initial EPA Involvement

Between 1984 and 1988, Omega received many notices of violations from the Los Angeles County Department of Health. In the early 1990s, DTSC and EPA actively pursued the owner/operator of Omega to remove drums of contaminants and to clean up the former

Omega property. On August 27, 1993, at the request of DTSC, EPA conducted an assessment of the Omega facility to evaluate the condition of approximately 3,000 drums of unprocessed hazardous waste, which occupied most of the available storage space on the property. The drums were situated on pallets; in some locations, the drums were stacked three high; many were weathered from years of outside storage. EPA concluded from the 1993 assessment that the Omega facility represented a significant waste management problem. However, the State of California remained the lead agency for the former Omega property at that time.

In January 1995, DTSC again requested EPA assistance in re-evaluating the condition of the facility. A preliminary assessment was conducted on January 19, 1995, and the following conditions were observed at the facility:

- Approximately 3,000 drums were observed stacked three high, some without pallets between them.
- A large majority of the drums appeared to be extremely corroded.
- Numerous drums were observed leaking onto other drums and onto a concrete pad.
- Numerous spills were observed leading away from the drums to other parts of the property.

On May 9, 1995, EPA issued a Unilateral Administrative Order (UAO) to the owner of Omega and to the generators of the hazardous substances that had shipped 10 or more tons of hazardous substances to the former Omega property. During 1995 and 1996, a group of potentially responsible parties (PRPs) later known as the Omega Chemical Site PRP Organized Group (OPOG) with EPA oversight removed approximately 3,000 drums from the former Omega property and collected subsurface soil and groundwater samples.

2.2.2.2 Summary of Enforcement Activities

Numerous enforcement and response actions have been taken at the Omega Site by various regulatory agencies and PRPs. A summary of these actions follows:

1984 to 1991. Omega received numerous Notices of Violations (NOVs) from the Los Angeles County Department of Health. These violations were issued for the improper labeling of drums, leaking drums, incomplete hazardous waste manifests, and numerous safety violations.

November 1990. A preliminary injunction was filed by the Los Angeles County Superior Court enjoining Omega from accepting any offsite hazardous waste.

February 1991. The offices of the San Bernardino and Los Angeles County District Attorneys issued warrants to search three railcars on the former Omega property. The search revealed illegal storage and transport of 700 hazardous waste drums and falsified manifests and drum labels.

April 1991. The Los Angeles County Superior Court ordered Omega to cease operations, remove all hazardous wastes, and close the facility.

October 1991. EPA entered into an Administrative Order on Consent, requiring Omega to perform several interim measures to mitigate current or potential threats to human health or the environment (e.g., improve facility security, repack leaking drums, and immediately remove them to an appropriate Class I facility) and to submit a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI).

August 1993. DTSC requested assistance from EPA to conduct a site assessment of the Omega facility. EPA tasked the Technical Assistance Team (TAT) contractor to conduct a site assessment, at which time TAT observed approximately 2,900 drums of hazardous wastes that entirely filled all available storage space at the facility. The drums were situated on pallets, sometimes three high and stacked in rows across the facility. Many of the drums were weathered from years of outside storage; however, only a few of the drums inspected displayed any signs of gross deterioration or were leaking. The conclusion reached from this 1993 TAT assessment was that Omega Site represented a significant waste management problem. The State of California remained lead agency for the Omega Site at that time.

January 1995. The Los Angeles County Superior Court found Dennis O'Meara, president of Omega, in contempt of court for failing to follow its orders. The court ordered Mr. O'Meara and Omega to cease all operations at the former Omega property and to cooperate fully in all efforts to investigate and implement appropriate action at the former Omega property.

March 1995. Dennis O'Meara pled guilty to two felony counts of illegal storage and disposal of hazardous waste.

May 1995. EPA issued a UAO to the facility operators (Omega and Dennis O'Meara) and to the generators of hazardous substances who each sent at least 10 tons of hazardous substances to Omega. This UAO required the Respondents to remove approximately 2,700 drums at the former Omega property and to dispose, stabilize, or treat grossly contaminated concrete, asphalt, and/or soils found at or near the surface and to conduct surface and subsurface soil sampling and groundwater sampling to determine the nature and extent of contamination.

February 2001. EPA and OPOG entered into a Partial Consent Decree (Partial CD) to address soil and groundwater contamination on the former Omega property and the area immediately downgradient. The Partial CD includes the following tasks: (1) design and implement a groundwater containment and mass treatment system for the Phase 1a (OU-1) Area (including conducting a groundwater Engineering Evaluation/Cost Analysis [EE/CA] to evaluate the nature and extent of groundwater contamination in the OU-1 area); (2) implement a vadose zone soils Remedial Investigation/Feasibility Study (RI/FS) for contaminant releases on or emanating from the former Omega property; and (3) install three sentinel groundwater monitoring wells and conduct quarterly sampling for one year.

May 2004 to September 2005. EPA and OPOG conducted indoor air sampling within two buildings on the former Omega property and three others nearby, including a roller skating rink (Skateland) located next door to Omega. The purpose of the sampling was to determine whether contaminants in soil gas (i.e., soil vapor) on the former Omega property had migrated into buildings overlying the area of soil contamination. The results indicated varying degrees of vapor intrusion into each building at OU-1, and the highest levels of indoor air contamination were found within the Skateland building. In December 2004, air purifiers were installed in the Skateland building to reduce concentrations of volatile organic compounds (VOCs) in indoor air. OPOG also sealed cracks in the floor that might have been acting as points of entry for vapors migrating into the building.

July 2004. EPA issued a UAO to 19 PRPs to install and sample additional OU-2 groundwater monitoring wells. The wells have been installed and are being used in determining the nature and extent of OU-2 contamination.

September 2005. OPOG conducted sub-slab depressurization (SSD) field testing to evaluate the potential effectiveness of a full-scale treatment system at Skateland. The results indicated that SSD would be effective in reducing indoor air VOC concentrations.

September 2005. Following completion of the EE/CA, EPA issued an Action Memorandum to construct and operate an interim groundwater pump and treatment system for the OU-1 area. The objective of this interim groundwater action is to contain the highest levels of groundwater contamination until a permanent remedy is selected.

April 2006. EPA issued an Action Memorandum to reduce levels of indoor air contaminants at the Skateland facility. OPOG's obligation to implement this removal action was memorialized in an amendment to the Partial CD. In September 2006, OPOG purchased the Skateland property and in April 2007 demolished the building, eliminating the need for the indoor air cleanup action.

2.3 Community Participation

In June 2008, the Omega Site OU-1 Proposed Plan (EPA, 2008), Remedial Investigation, Feasibility Study, and Human Health Risk Assessment reports (CDM, 2007a, 2008, and 2007b) were made available to the public. These documents can be found in the Administrative Record file at the EPA Region 9 Superfund Records Center, located at 95 Hawthorne Street (4th floor) in San Francisco, and at the information repository located at the Whittier Public Library at 7344 S. Washington Avenue in Whittier, California. A public notice was published on June 6, 2008, in the *Whittier Daily News* to notify community members about the availability of the Proposed Plan. The Proposed Plan was also mailed to the community. The Public Notice also announced the date and location for the public meeting and identified the public comment period (June 9 through July 10, 2008).

The public meeting for the Proposed Plan was held June 24, 2008. At this meeting, EPA representatives presented the Proposed Plan and answered questions about the preferred alternative and issues regarding contamination at OU-1. No comments or objections concerning the preferred alternative were raised at the meeting. The transcript for the public meeting is part of the Administrative Record file at the information repositories. Comments received by EPA after the public meeting and corresponding EPA responses are presented in Part 3 (Responsiveness Summary) of this Record of Decision.

2.4 Scope and Role of Operable Unit or Response Action

OU-1 includes soil and groundwater contamination on and near the former Omega property, and extending approximately 100 feet southwest of Putnam Street.

In 2001, EPA signed a Partial Consent Decree with OPOG, requiring OPOG to investigate soil and groundwater contamination within OU-1. With EPA oversight, OPOG completed the OU-1 vadose zone RI report in November 2007 (CDM, 2007a) and the OU-1 FS in May 2008 (CDM, 2008). The selected remedy will address soil and soil vapor contamination within OU-1. The goal of the Omega Site OU-1 soil remedy is to remove soil contamination to reduce risk associated with exposure to contaminated soils and contaminant vapors, and to reduce the impact of the soil contamination on groundwater.

The Partial CD also specifies that OPOG will construct and operate a groundwater treatment system to contain the existing contaminated groundwater within OU-1. This interim groundwater action is being conducted as a non-time-critical removal action under CERCLA until a final groundwater remedy is selected in a later decision document. The goal of the Omega Site OU-1 interim groundwater response action is to contain the highest levels of contamination dissolved in groundwater within OU-1, so that the contamination does not continue to migrate and contribute to the OU-2 plume. Construction of the groundwater treatment system is underway and is expected to be complete in 2009.

The future Omega Site groundwater remedy will include OU-1 and OU-2, and also other source areas within OU-2.

2.5 Omega Site Characteristics

2.5.1 Conceptual Site Model

This Section presents the Conceptual Site Model with respect to sources of contamination, the nature and extent of contamination, contaminant fate and transport, and the potential exposure and receptor pathways.

The contaminants present in the subsurface at the former Omega property, which primarily consist of VOCs, are believed to be the result of multiple releases from a combination of events including leaking above and/or underground storage tanks, on-site surface spillage, and leaking drums. The extent of the vadose zone contamination at OU-1 is based on the analytical results for the sampled media including soil, soil gas, groundwater, and indoor air; the sample locations are shown in Figures 3 and 4. Soil sampling results generally show higher levels of VOCs in soil vapor in the areas where chemicals were stored or where chemicals might have been spilled on the former Omega property. A zone of elevated VOC concentrations was also found outside of the former Omega property at boring B-4 along Putnam Street. At this location, elevated VOC concentrations are present starting at a depth of 5 feet and extending to the water table. Historical aerial photos indicate that waste liquids likely drained from the former Omega property to this location and percolated down to the water table.

The highest VOC concentrations in soil and groundwater are primarily located at the former Omega property. Groundwater beneath the former Omega property is contaminated with, in general, the same compounds detected in soils and soil vapor at the former Omega property. PCE is, by far, the most prevalent contaminant in groundwater and occurs in the highest concentrations at levels exceeding 1,000 milligrams per liter (mg/L). Additionally, similar to soil vapors at the former Omega property, Freons (both 11 and 113) and trichloroethene (TCE) have also been detected in groundwater, with concentrations exceeding 1 mg/L. Other detected compounds in groundwater include 1,1,1-trichloroethane (TCA), 1,1-dichloroethene (DCE), and cis-1,2-DCE.

Vertical and lateral transport of the contaminants at OU-1 includes migration through the unsaturated soil into groundwater and volatilization from the groundwater back into the vadose zone. Surface runoff likely contributed to lateral spreading of contamination.

The potential exposure media at OU-1 include soil gas, indoor and ambient air, surface and subsurface soil, and groundwater. The potential exposure pathways at the OU-1 include inhalation, ingestion, and dermal contact.

2.5.2 Overview of OU-1

OU-1 of the Omega Site encompasses the former Omega property and an area approximately 100 feet southwest of Putman Street, Whittier, California, referred to in the Partial Consent Decree as the "Phase 1a area" (Figure 2). The former Omega property, located at 12504 and 12512 Whittier Boulevard in Whittier, California, occupies Los Angeles County Assessor Tract No. 13486, Lots 3 and 4 a. The former Omega property is approximately 41,000 square feet in area (200 feet wide by 205 feet long), which is just less than one acre. The land surface at the former Omega property slopes southwest to south-southwest at approximately 0.016 feet per foot, and is situated at approximately 220 feet above mean sea level (msl).

The Omega facility maintained 11 treatment units, which included distillation columns, reactors, a wipe film processor, a liquid extractor, and a solid waste grinder. The facility maintained 22 stainless steel tanks with capacities ranging from 500 to 10,000 gallons, and 5 carbon steel tanks with capacities of 5,000 gallons.

Two structures, a former warehouse (now leased by Star City Auto Body) and an office building measuring approximately 140 by 50 feet and 80 by 30 feet, respectively, comprise about one-quarter of the former Omega property. OU-1 also includes one industrial property immediately adjacent to the former Omega property, i.e., the Terra Pave, Inc. facility, located at 12511 East Putnam Street, adjacent to the southwestern boundary of the former Omega property. Figure 5 shows the facilities within and near OU-1.

2.5.2.1 Hydrogeology

In the vicinity of the former Omega property, groundwater typically is encountered between 70 and 80 feet below ground surface (bgs) and flows to the southwest. A cross-section about 1.5 miles south of the former Omega property is presented in Bulletin 104 (DWR, 1961), which suggests that the uppermost aquifers present are the Gage and Jefferson aquifers. The upper portion of the shallow aquifer might represent the Gage aquifer, while the lower aquifer is potentially the Hollydale or Jefferson aquifer. The Gage aquifer is the major water-bearing member of the Lakewood formation in the Whittier area, where it consists of about 30 feet of sand with some interbedded clay. The Gage aquifer can attain maximum depths of 150 feet. The Jefferson aquifer is part of the Lower Pleistocene San Pedro formation that underlies the entire Whittier area. The formation is composed of sand and gravel with interbedded clay, likely of marine origin. The Jefferson aquifer ranges in thickness from 20 to 40 feet and reaches a maximum depth of 350 feet.

Below the Gage and Jefferson aquifers are deeper members of the Lower Pleistocene San Pedro formation. From shallowest to deepest, they are the Hollydale, Lynwood, Silverado, and Sunnyside aquifers. The Hollydale aquifer might be located beneath the Omega Site because the Site is located in the western part of the Whittier area. The Hollydale aquifer ranges in thickness from 10 to 25 feet and reaches a maximum depth of 100 feet, and it merges with the overlying Gage near South Whittier. The Lynwood aquifer ranges in thickness from 50 to 100 feet and extends to a maximum depth of 460 feet. The Silverado aquifer ranges in thickness from 110 to 300 feet and extends to a depth of 750 feet. The Sunnyside aquifer consists of 200 to 300 feet of sand and gravel and reaches a depth of 1,000 feet. Omega Site borings have not penetrated any of these deeper formations.

2.5.2.2 Vadose Zone

The vadose zone at OU-1 has been characterized by a combination of soil borings and a membrane-interface probe (MIP) investigation. It generally consists of clayey silts with occasional thin lenses of fine sand.

A distinct lithologic layer starting at an approximate depth of 30 feet bgs (hereinafter referred to as the 30-foot unit) was found across OU-1. The 30-foot unit is interpreted to be a sandy to silty lithology with less clay overlying a marker clayey silt bed. The unit is between 3.5 to 11 feet thick. The top of the unit slopes generally to the west-southwest with a southwesterly trough directly beneath the center of OU-1. The 30-foot unit appears to have aided the lateral spreading of contaminants in the vadose zone at OU-1.

2.5.2.3 Saturated Zone

Groundwater investigations performed to date have indicated that the saturated zone (i.e., soils below the water table that are fully saturated by groundwater) consists of two aquifer zones (consisting of permeable, sandy soils) at OU-1, which are separated by a confining zone of low permeability soils (e.g., silts). The first sandy zone is encountered near the first occurrence of groundwater, originating a short distance southwest of the former Omega property and thickening to the west. MIP borings and soil borings advanced at the former Omega property indicate that the sandy unit does not exist beneath the former Omega property. The sandy unit was observed in borings along Putnam Street and is characterized by low conductivity between 45 and 60 feet bgs.

A second sand unit was found starting at about 120 feet bgs along Putnam Street. The unit continues to the southwest but its extent beneath the former Omega property is not known. Similar to the shallower unconfined aquifer, the deeper confined aquifer might also become thin under the former Omega property and thicken to the west. Only the deeper wells to the west penetrate into this unit; it was not observed at well OW-1B at the Terra Pave facility. The deeper confined aquifer is characterized by sand with some silt.

Groundwater flow in the unconfined aquifer has been consistently toward the southwest. The piezometric heads are significantly higher in the shallow aquifer. This indicates that a significant confining zone limits flow between these zones.

2.5.3 Sampling Strategy

The objective of the field investigation was to collect the data needed to characterize the nature and extent of contamination in OU-1 soils to support the data needs of the risk assessment (CDM, 2007b), feasibility study (CDM, 2008), and an Agency for Toxic Substances and Disease Registry (ATSDR) Public Health Assessment (ATSDR, 2001 and 2007).

Figures 3 and 4 show the sampling locations. The following types of samples were collected: surface soil, subsurface soil, soil vapor, indoor air and outdoor air samples. Field lithologic observations were recorded during coring; soil conductivity and in situ soil/soil vapor VOC data were collected from MIP borings; and soil samples were analyzed for physical parameters. In addition to collecting environmental samples, surveys of heating, ventilating, and air conditioning (HVAC) systems and surveys of chemical usage were conducted during walk-throughs of the buildings on the former Omega property, as well as on other adjacent and nearby facilities.

Approximately 208 soil samples, 8 of which were duplicates, were collected during approximately 13 sampling events from 1995 to 2006. A total of 298 groundwater samples, 34 of which were duplicates, were collected during roughly 32 sampling events from 1996 to 2006. Soil gas samples were collected from a total of 97 locations at depths up to 71 feet bgs. Seven soil gas sampling events occurred from 2004 to 2006, and a total of 271 samples (31 of which were duplicates) were collected. Sixty-eight indoor air samples (11 of which were duplicates) were collected from 25 locations during seven sampling events from 2004 to 2006. Thirteen ambient air samples (including one duplicate) were collected from nine locations during four of these sampling events.

The sampling proceeded in several phases. Investigations of the three properties immediately adjoining the former Omega property (Skateland, Terra Pave, and the Medlin & Son South Building [formerly Cal-Air]) were initiated in 2003. Based upon the analytical results of samples collected from these adjoining properties, the investigation was expanded to include four additional nearby properties: the Medlin & Son North Building, L.A. Carts, Oncology Care Medical Associates, and the Bishop Company.

2.5.4 Known or Suspected Sources of Contamination

The combined storage capacity of the 27 tanks present at the Omega facility in 1990 was 109,400 gallons. According to the facility's Operation Plan, the 5,000- and 10,000-gallon storage tanks were used to store solvent wastes prior to distillation. Additionally, over 3,000 drums of liquid waste were present at the property in 1995.

The contaminants present in the subsurface at the former Omega property, which primarily consist of VOCs, are believed to be the result of multiple releases from one or a combination of events including:

- Leaking from aboveground and/or underground storage tanks and associated piping. Historical information suggests that such potential sources are most likely on the northern and northwestern portion of the former Omega property (see Figure 6, which illustrates the locations of historical tanks and the loading dock area).

- Transport of on-site surface spillage (such as spillage from aboveground tanks, from drum storage areas, and from poor housekeeping practices) over pavement to unpaved areas with subsequent infiltration. These types of releases could have occurred anywhere on the former Omega property, and wastes could have been transported via surface runoff onto directly adjacent properties (e.g., Terra Pave).
- Leaking drums, particularly those that were located in the northern and northwestern portion of the former Omega property.

Additionally, well BMW1, reportedly installed as a monitoring well in 1986 but whose location and construction details have never been confirmed, may have acted as a direct conduit that transmitted contaminants from the ground surface straight to groundwater. In addition, as previously discussed, a 500-gallon underground storage tank (UST) located in the loading dock area (and removed in 1987) is also considered to have been a source.

Once in the ground, the contaminants likely infiltrated into the vadose zone, dispersing laterally at permeability contrasts, such as the 30-foot unit. The released liquids infiltrated through the unsaturated soils into groundwater.

2.5.5 Types of Contamination

Omega operated a facility for recycling and treatment of spent solvents and refrigerants. Drums and bulk loads of waste solvents and chemicals (primarily chlorinated hydrocarbons and chlorofluorocarbons) from various industrial activities were processed to form commercial products, which were returned to generators or sold in the marketplace. Wastes accepted by Omega for recycling included organic solvents and chemicals, and aqueous wastes with organic waste constituents. The incoming wastes were generated by a wide assortment of manufacturing and industrial processes (such as petroleum refining, rubber and plastics, chemicals, paper and allied products, furniture and fixture products, lumber and wood products, printing and publishing, textile mill products, and food and kindred products).

An Operation Plan, prepared by Omega in 1990 for proposed expansion of the facility, provided a summary of current and proposed facility processes, tank capacities, incoming and facility-generated waste stream characteristics, and handling practices, etc. Typical types and volumes of wastes generated by Omega consisted of the following: C6 to C11 aliphatics (43.4 percent by volume), xylene (16 percent), toluene (7.2 percent), C9 to C10 alkyl benzenes (5.2 percent), isopropyl alcohol (5.1 percent), and a variety of other compounds. As an example, hazardous wastes manifested offsite from the Omega facility during 1989 consisted of the following: 19,300 gallons of aqueous solutions with total organic residues less than 10 percent (Department of Health Services [DHS] Code 134); 1,600 gallons of halogenated solvents (DHS Code 211); 47,245 gallons of still bottoms with halogenated organics (DHS Code 251); 665,000 gallons of other bottom wastes (DHS Code 252); and 120 tons of other organic solids (DHS Code 352).

A total of 44 VOCs were detected at least once in the soil vapor samples. Also, a variety of VOCs were detected in soil and air samples collected during the RI. Tetrachloroethene (PCE) is generally the most widespread compound at the Omega Site; thus, it has been used to define the extent of contamination. Other compounds are present at high concentrations and are widely distributed (for example, Freons).

The constituents of potential concern (COPCs) include:

Solvents	
1,1,1-trichloroethane	Carbon tetrachloride
1,1,2-trichloroethane	Chloroform
1,2-dichlorobenzene	Isophorone
1,2-dichloroethane	Tetrachloroethene
1,4-dioxane	Trichloroethene
Benzene	Trichlorofluoromethane
Benzyl alcohol	
Inorganics	
Aluminum	Manganese
Barium	Mercury
Beryllium	Molybdenum
Cadmium	Nickel
Chromium	Silver
Cobalt	Thallium
Copper	Vanadium
Iron	Zinc
Lead	
Pesticides	
2-methylnaphthalene	4,4-dichlorodiphenyltrichloroethane (DDT)
4,4-dichlorodiphenyldichloroethane (DDD)	Bis(2-ethylhexyl)phthalate
4,4-dichlorodiphenyldichloroethene (DDE)	Dieldrin
Stabilizers/Plasticizers	
Butylbenzyl phthalate	Polychlorinated biphenyl (PCB)-1254
Fluoranthene	Total PCBs
Research Chemicals/Chemical Intermediates	
Benzo(a)pyrene	Benzo(a)anthracene
1,1-dichloroethene	Chrysene
Benzo(b)fluoranthene	Phenanthrene
Naphthalene	

It is noted that some of the solvent compounds were historically also used as pesticides or were part of pesticide applications.

2.5.6 Extent of Contamination

PCE was detected above its residential and industrial/commercial preliminary remediation goals (PRGs) in soils at OU-1. PCE is the compound that is the most widespread at OU-1; thus, it is used to define the area that has been impacted by releases at and emanating from the former Omega property. Figure 7 presents the locations where soil samples had exceedances of the PRGs for PCE.

The PCE distribution for shallow soil vapor samples (Figure 8) indicates that the areas with the highest PCE concentrations in the vadose zone are primarily located at OU-1. The total

VOC distribution for shallow soil vapor samples is similar to the distribution of PCE. The volume of contaminated soil at OU-1 is approximately 630,000 cubic yards.

Groundwater beneath OU-1 is contaminated with, in general, the same compounds detected in soils at OU-1. PCE is the most prevalent contaminant in groundwater at OU-1 and occurs in the highest concentrations at levels exceeding 1,000 milligrams per liter (mg/L). Additionally, similar to soil vapors at the former Omega property, Freons (both 11 and 113) and trichloroethene (TCE) have also been detected in groundwater, with concentrations exceeding 1 mg/L. Other detected compounds in groundwater include 1,1,1-trichloroethane (TCA), 1,1-dichloroethene (DCE), and cis-1,2-DCE.

Other contaminants are also present in the soil. These include various metals, polychlorinated biphenyls (PCBs) and poly-nuclear aromatic hydrocarbons (PAHs). Based on the available data, these contaminants present a long-term risk that is within acceptable limits for residential use of the property, and therefore EPA is not proposing a cleanup plan for those contaminants.

2.5.6.1 Migration Pathways

The contaminants at the former Omega property have migrated vertically through the unsaturated soil into groundwater. In the vadose zone soils, the contaminants were transported dissolved in water and also as vapors. Lateral spreading occurred mainly at permeability contrasts, such as within the sandy soils of the 30-foot unit.

Contaminants in the saturated zone (below the water table) have been transported with groundwater flow primarily to the southwest. Contaminant vapors migrated laterally from subsurface soils beneath the former Omega property to soils beneath buildings on adjacent properties within OU-1. VOC vapors also occur in soils as a result of volatilization (off-gassing) of contaminants dissolved in groundwater beneath the buildings; these vapors can then migrate upward.

In addition, surface runoff is another likely pathway that contributed to the lateral spreading of contamination released at the former Omega property.

2.5.6.2 Potential Vapor Intrusion

The contaminant vapor migration pathway from soil into buildings is of particular concern. Once VOC vapors have migrated into soils beneath buildings, such as those on or adjacent to the former Omega property, the vapors could enter through cracks, fractures, and holes in the building slab. Utility corridors through the building slab and/or walls also can act as preferential conduits for the transport of VOC vapors into the buildings.

2.5.6.3 Potential Exposure Pathways and Receptors

Potential exposure pathways and receptors can be summarized as follows:

- The former Omega property and/or the surrounding properties within OU-1 are expected to be used for business offices, medical and dental offices, light manufacturing and assembly, other business and service establishments, live/work space, multi-unit residential development, educational institutions and training facilities including vocational schools, or retail development in the future (City of Whittier, 2005). Residents and commercial/industrial workers are the receptors that could potentially be exposed to the contamination at OU-1.

- The pathway with the highest potential for exposure involves intrusion of vapors into indoor air spaces within OU-1. The likely receptors are the current or potential future residents and commercial/industrial workers.
- Future commercial/industrial workers and residents could also be exposed to contaminants in soil (for example, by dermal contact or ingestion). Contaminated soil in this area extends from 0 to 80 feet below ground surface.
- There are no ecological receptors at OU-1 due to the lack of suitable habitat. Therefore, there is no potential for exposure of wildlife to contaminated soil and VOC vapors at OU-1.

2.6 Current and Potential Future Land and Water Uses

2.6.1 Current On-Site Land Uses

The OU-1 portion of the Omega Site is located in a commercial/industrial area in Whittier, California. From 1976 to 1991, Omega operated a recycling and treatment facility for commercial and industrial solid and liquid wastes and a transfer station for storage and consolidation of wastes for shipment to other treatment and/or disposal facilities. In 2003, Van Owen Holdings LLC of Los Angeles, California purchased the property. Currently, two buildings (an office building and a warehouse) are located at the relatively flat former Omega property, with concrete paving covering exterior areas (Figure 2). Star City Auto Body occupies the warehouse (12504 Whittier Boulevard) and performs auto body repair and painting on the premises. The auto body shop also leases the small paved parking lot north of the warehouse building for automobile parking. The former Omega administration building (12512 Whittier Boulevard) and larger paved parking area south of the warehouse have had a variety of tenants since 2003. The former administration building is currently unoccupied, and the parking lot is used for temporary storage of wooden pallets by L&M Pallets on a month-to-month lease basis.

2.6.2 Current Adjacent/Surrounding Land Uses

Figure 5 shows the former Omega property and immediate vicinity. One commercial property (formerly Skateland) and two industrial properties (Medlin & Son and Terra Pave) are immediately adjacent to the former Omega property (southeastern, northwestern, and southwestern boundaries, respectively). The northeastern boundary of the former Omega property is bordered by Whittier Boulevard and a frontage road. The former Skateland facility, located at 12520 Whittier Boulevard, housed an indoor roller skating rink but was demolished in April 2007; the lot is now vacant except for the groundwater treatment plant constructed by OPOG. The Medlin & Son facility (former Cal-Air facility), located at 12484 Whittier Boulevard, is operated as a machine shop (such as screw machines, lathes and mills, tapping and threading, saw cutting, and welding). The Terra Pave, Inc. facility, located at 12511 East Putnam Street, includes an office building and open areas used for temporary storage of asphalt paving materials for various job sites. Terra Pave also utilizes the property to park and maintain a variety of support vehicles and heavy-duty paving equipment.

LA Carts is located at 12549 East Washington Boulevard, a short distance south of Skateland. LA Carts manufactures portable food carts, most of which are fabricated from stainless steel sheeting. Oncology Care is located at 12535 E. Washington Boulevard., at the northeast corner of Putnam Street and Washington Boulevard. Oncology Care is housed in a 3,720 square foot, U-shaped, one-level building, with an exterior paved parking lot. The building has a reception/waiting area in the front, with offices, examination rooms, a medicine storage/mixing room, and treatment room occupying the remainder of the building. The Bishop Company is located at 12519 E. Putnam Street, south-southwest of the former Omega property. The Bishop Company is a wholesale distributor of arborist and landscaping tools and equipment.

Nearby residential land use occurs across Whittier Boulevard to the northeast (upgradient); these residences are located approximately 250 feet from the former Omega property, outside of the boundaries of OU-1. Other residential areas are located beyond the commercial development south of Washington Boulevard.

2.6.3 Future Land Uses

The zoning of the properties within OU-1, pursuant to the Whittier Boulevard Specific Plan-Workplace District (City of Whittier, 2005) allows for business offices, medical and dental offices, live/work units, multi-unit residential development, educational institutions, and also for commercial and light manufacturing.

Sensitive commercial land uses could occur on the property in the future based on the Specific Plan's designation of land uses, as well as current use of properties within OU-1. For example, patients undergoing chemotherapy or radiology at the existing Oncology Clinic are likely to have suppressed immune systems. As such, they are a potentially sensitive population that may be more affected by exposure to chemicals than the average healthy person. Other nearby medical facilities include the Kaiser Permanente clinic located at 12470 Whittier Boulevard and Presbyterian Medical Hospital located at 12401 Washington Boulevard (about 300 feet and less than 0.5 mile from the former Omega property, respectively). The former Omega property may be developed for similar, sensitive commercial land use in the future.

2.6.4 Current Groundwater and Surface Water Uses

The nearest water supply well, 02S/11W30-R3, also known as SFS No. 1, is located 1.3 miles west-southwest from the Omega facility. The top of the screen interval of SFS No.1 is at 200 feet below ground surface, near the maximum depth of the contaminant plume originating at the Omega Site. TCE, chloroform, and PCE have been found in the water produced by this well, and the City of Santa Fe Springs has a wellhead treatment unit utilizing granular activated carbon on this water supply well.

The shallow aquifer in the vicinity of the Omega facility correlates with the Gaspur and Gage aquifers, which likely merge in this area. Currently, groundwater underlying OU-1 is not used for any purpose other than sampling, as part of the cleanup of OU-1 and the Omega Site generally. Use for potable purposes within this area is also unlikely for the future due to the presence of high concentrations of total dissolved solids (TDS). Concentrations of TDS in groundwater samples from 2004 to 2006 ranged from 630 to 1,700 mg/L. The EPA secondary standard for TDS in drinking water is 500 mg/L while the California EPA (Cal-EPA) maximum contaminant level (MCL) for TDS in drinking water ranges from 500 mg/L (recommended) to 1,000 mg/L (upper) with a short-term limit of 1,500 mg/L. As discussed in greater detail in Section 2.7 of this ROD, risks from contaminated groundwater could theoretically result from volatilization of groundwater contaminants into ambient and indoor air.

No surface water bodies exist within OU-1.

2.7 Summary of Site Risks

2.7.1 Human Health Risks

The baseline risk assessment (CDM, 2007) for OU-1 estimates human health risks if no action is taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the evaluation of potential risks to human health associated with exposure to contaminated soil, indoor air, and soil gas at OU-1.

General methods for selection of COPCs followed EPA policy (EPA, 1989) of initially including chemicals observed at the site, regardless of potential for human health risk, and putting any risks due to exposure to chemicals at the site in perspective during the risk characterization. In keeping with this policy, all chemicals detected in media at the site were retained as COPCs, with the following few exceptions:

- Inorganic soil constituents that are essential minerals and/or are present only at concentrations consistent with local ambient conditions;
- Chemicals detected in less than five percent of all samples, provided that other criteria as described below were met; and
- Chemicals without available toxicity criteria.

PCE is the main risk driver because of its high concentrations in all sampled media and its high frequency of detection at OU-1, and because of its potential for risk to human health.

The COPCs, receptor populations and exposure pathways for the risk assessment are described above in sections 2.5 and 2.6. Table 1 presents the exposure point concentrations (EPCs) used to calculate intake of each COPC in the various media. By taking the exposure scenarios and applying the appropriate toxicity factors, EPA arrived at a characterization of potential health risks to workers and future residents (Tables 2 and 3).

Minimum and maximum indoor air concentrations were both evaluated to provide a potential range of risks and hazards. Because measured indoor air concentrations in current buildings may not represent future indoor air concentrations, indoor air exposure concentrations for future construction and industrial workers and hypothetical residential receptors were evaluated by modeling based on soil gas data.

Inhalation of ambient air was evaluated for current industrial workers using measured ambient air concentrations. However, because measured ambient air concentrations may not represent future ambient air concentrations, ambient air exposures for future construction workers, industrial workers, and hypothetical residential receptors were estimated by modeling.

Carcinogenic toxicity criteria are usually provided as cancer slope factors (CSFs) in units of excess risk per milligram of chemical per kilogram of body weight per day, expressed as $(mg/kg\text{-}day)^{-1}$. These factors are based on the assumption that no threshold exists for carcinogenic effects, and any dose is associated with some finite carcinogenic risk. The CSF describes the increase in an individual's risk of developing cancer over a 70-year lifetime per unit of exposure, where the unit of exposure is expressed as (mg/kg-day). CSFs are calculated using methods protective of human health and are based on the assumption that cancer risks decrease linearly with decreasing dose. The 95 percent upper confidence limit estimate for the slope is used in most cases to compensate for animal-to-human extrapolation and other uncertainties. The resulting CSFs are considered to be upper-range estimates that are unlikely to underestimate carcinogenic potential in humans. The results of the CSF calculations are presented in Tables 4 through 7.

Carcinogenic risks are estimated as the incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens (EPA, 1989). The estimated risk is expressed as a unitless probability (e.g., 2×10^{-6}). The equation for calculating the potential excess cancer risk for each carcinogenic chemical is:

Risk = CDI x CSF

Where:

Risk = Lifetime Excess Cancer Risk from exposure to the chemical

CDI = Chronic Daily Intake in milligrams per kilograms per day (mg/kg-day)

CSF = Cancer Slope Factor expressed in $(mg/kg\text{-}day)^{-1}$

An estimate of an individual's cumulative excess lifetime cancer risk from potential exposure to multiple chemicals at OU-1 is then calculated by summing the chemical-specific excess cancer risks.

The potential for non-carcinogenic health effects is evaluated by comparing the estimated daily dose to the chemical-specific oral or inhalation reference dose (RfD), expressed in units of mg/kg-day. The ratio of exposure to reference dose is termed the hazard quotient (HQ). To evaluate the potential for cumulative non-carcinogenic adverse health effects from simultaneous exposure to multiple chemicals, hazard quotients for all chemicals that affect the same target organs are summed, yielding hazard indices. In general practice, all hazard quotients are summed to yield a total hazard index (HI). If that total hazard index is greater than one, then the hazard quotients for the different chemicals are separated by toxicity endpoint and then summed to determine the total hazard index for each toxicity endpoint.

The equation for calculating a chemical-specific non-cancer hazard quotient is:

HQ = CDI/RfD

Where:

HQ = Hazard Quotient

CDI = Chronic daily intake expressed in (mg/kg-day)

RfD = Chronic Noncancer Reference Dose expressed in (mg/kg-day)

The complete results from these calculations may be found in Appendix A of the Human Health Risk Assessment (HHRA); important results can be summarized as follows:

- Among receptors likely to be exposed to Site-related contaminants, the highest cancer risks and noncancer hazards are associated with exposure of hypothetical future residents within OU-1, with risks above the EPA risk range and hazard indices above the target threshold.

- Intrusion of vapors into indoor air spaces is the pathway with the highest potential for both cancer risk and noncancer hazard. For example, inhalation of indoor air presents a maximum potential excess lifetime cancer risk to future residents (adult plus child) of 5.0×10^{-3}. The same risk for current industrial workers ranges from 8×10^{-6} to 7×10^{-5}.

- No complete exposure pathways currently exist that involve direct contact with contaminants in groundwater at OU-1.

- PCE is the primary risk driver at the Omega Site. Cancer risk associated with inhalation exposure to PCE alone ranges from 5×10^{-7} to 4×10^{-5}. Estimated hazards for exposure to PCE were relatively low, however. Hazard Quotients (HQs) for exposure to indoor air for PCE ranged from 0.01 to 1.6 compared to a total inhalation Hazard Index (HI) ranging from 0.06 to 8.

- Ambient air risks for construction workers are within and near the lower end of the EPA risk range, and ambient air hazards are below the target threshold of one. Subsurface VOC contamination appears to be insufficient to sustain releases that would produce significant ambient air concentrations over the 1-year time period assumed for construction worker exposures.

- Under the reasonable maximum exposure (RME) scenarios, total chronic cancer risks and total chronic non-cancer hazards, respectively, for future exposure to surface and subsurface soil to 12 ft bgs are as follows:

  - Commercial/industrial workers: 1×10^{-5} and 0.3
  - Construction workers: 1×10^{-6} and 0.8
  - Resident child: 3×10^{-5} and 3.2
  - Resident adult: 2×10^{-5} and 0.3
  - Resident adult + child: 4×10^{-5} and 0.9

  However, exposure to contaminants in soil via direct contact is unlikely to occur since the soil is currently covered with buildings, asphalt, and concrete, and such cover is likely to remain even if OU-1 is redeveloped for other commercial/industrial purposes in the future. Further, volatile COPCs, in particular PCE, acetone, and toluene, will not persist in soils exposed during excavation, and direct contact exposures (incidental ingestion and dermal contact) for construction workers via these pathways are expected to be minimal. These VOCs along with benzo(a)pyrene were associated with the bulk of risks and hazards estimated for direct contact exposure to surface soils.

- Despite uncertainties in the risk assessment, OU-1-related risks have been adequately characterized to support risk management decisions.
- OU-1-related risks involving exposure to PCE vapors in indoor air have been adequately assessed using the laboratory analytical results for air samples collected during the investigation and by modeling indoor air concentrations.

2.7.2 Ecological Risks

A Scoping Assessment was conducted for the Omega Site OU-1 through OU-3 by DTSC, EPA, and CH2M HILL on May 18, 2007. Scoping assessments are performed to determine whether plants or animals could be exposed to Omega Site contaminants and whether further Screening-Level Ecological Risk Assessment (SLERA) work is required. Risk can occur only when there is a contaminant source, a receptor, and a route of exposure between the source and receptor. DTSC recommends that a SLERA be prepared only if the scoping assessment has determined there is a source of contaminants, receptors are or will be present, and current or future land-use or offsite contaminant migration dictates that receptors might be exposed.

Ornamental trees and small areas of landscaped grass currently present within OU-1 represent extremely limited habitat and a very limited diversity of ecological receptors. Bird species tolerant of urban settings (for example, crows, pigeons, and sparrows) were the only wildlife observed at the Omega Site. The Scoping Assessment states that no endangered or threatened species were found. The closest body of water to the former Omega property is the San Gabriel River, located just over 2 miles away to the west. All other surface water drains over the Omega Site into concrete-lined washes and drains where there is no potential for wildlife contact with contaminated groundwater because the drains are above the water table.

Although VOC vapors have been detected in confined spaces (i.e., buildings) near the surface of OU-1, wildlife does not occupy these confined spaces and there is no potential for exposure to these vapors. There are no naturally occurring burrowing birds or mammals at the Omega Site due to the lack of suitable habitat. Therefore, it is extremely unlikely there would be any exposure of wildlife to contaminated soil and VOC vapors at OU-1. There are no complete exposure pathways between contaminants and receptors, and therefore no risk to ecological receptors. Due to the lack of suitable habitat, ecological receptors are not present at OU-1. The conclusion of the scoping assessment is that there is no risk to ecological receptors from groundwater and soil contaminants at OU-1.

2.7.3 Basis for Response Action

Properties within OU-1 are currently used for commercial/industrial purposes. However, as discussed above, residential use would be allowed under the City of Whittier's current zoning. Consequently, the HHRA evaluated existing commercial exposure scenarios as well as possible future residential scenarios.

The conceptual site exposure model, illustrated in Figure 9, was developed based on the results of the characterization of vadose zone contamination at OU-1, potential exposure routes, and potentially exposed populations.

The HHRA identified several possible pathways by humans might be exposed to contaminants in the OU-1 vadose zone soils. These pathways for exposure include direct contact with contaminated soil (through dermal contact or ingestion) and inhalation of soil vapors. Vapor intrusion represents the most significant risk. Vapor intrusion has been documented in several buildings within OU-1, although there is no risk to workers from short-term exposure based on the data collected. Future residential use of the former Omega property would result in estimated chronic exposure risks that exceed the upper bound of EPA's acceptable risk range. Because the OU-1 surface is largely paved, direct contact is not considered to be a current risk with the exception of construction workers, i.e., individuals that might disturb the paved surface and excavate soil. There are no significant ecological risks because the area is largely paved and contamination is below the ground surface, and no ecological receptors were identified.

The response action selected in this Record of Decision is necessary to protect the public health or welfare or the environment from actual or threatened release of hazardous substances into the environment.

2.8 Remedial Action Objectives

The RAOs for the OU-1 vadose zone soils remedy are as follows:

- Reduce or eliminate the vapor intrusion risk associated with VOC vapors in contaminated soils.
- Reduce or eliminate the risk associated with direct exposure to, contact with, and/or ingestion of contaminated soils.
- Reduce or eliminate contaminant migration to groundwater to levels that protect the groundwater resource.

The first two RAOs will be achieved by reducing VOC concentrations in soil and soil vapor to cleanup levels established in the Human Health Risk Assessment, based on future residential land use. These cleanup levels will apply to the upper vadose zone (in other words, from ground surface to 30 feet bgs).

The cleanup levels that quantitatively define the first two RAOs are the risk-based preliminary remediation goals that were developed in the HHRA. For PCE (a major risk driver), these cleanup levels are as follows:

- Indoor Air (residential exposure scenario) – 0.33 $\mu g/m^3$
- Shallow Soil Gas (residential exposure scenario) – 470 $\mu g/m^3$
- Soils (residential exposure scenario) – 1.2 mg/kg

The cancer risk to the receptors from exposure to the three contaminated media is 10^{-6} for PCE concentrations at the cleanup level.

The third RAO will be achieved by reducing soil and soil vapor concentrations to levels that are protective of the highest beneficial use of the aquifer. These specific cleanup levels will be determined during Remedial Design, using a one-dimensional modeling software, such as the EPA VFLUX model (DiGiulio and Varadhan, 2001) and a mixing cell model (EPA, 1981), or similar software, and will apply to the entire vadose zone. These vadose zone cleanup levels that are determined to be protective of groundwater will be reflected in a future groundwater ROD that selects a remedy for OU-1 groundwater.

2.9 Description of Alternatives

2.9.1 Remedy Components

2.9.1.1 Alternative 1 – No Action

The No Action Alternative would allow the OU-1 contamination to remain in place with no remedial actions being implemented. EPA is required by the NCP to evaluate the No Action alternative. This alternative establishes a baseline against which other alternatives can be compared.

2.9.1.2 Alternative 2 – Soil Vapor Extraction/Partial Capping/ICs

- Treatment Components

    Both shallow and deep SVE wells would remove contaminated vapors from below the ground surface and convey the vapors to a treatment system that would likely be constructed on the former Skateland property (see Figure 10). SVE wells would be installed on the former Omega and Skateland properties, and on the adjacent Terra Pave property to the southwest (see Figure 3).

    Contingencies for increasing the effectiveness of SVE, including hot air injection and dual phase extraction (DPE), would also be implemented if necessary to meet the cleanup goals.

    Soil vapors would be treated by passing them through granular activated carbon (GAC) to remove contaminants so that the treated air complies with the limits specified by the South Coast Air Quality Management District (SCAQMD) before being released to the atmosphere. Water generated from DPE would be pumped to the groundwater treatment system on the former Skateland property that is part of the interim groundwater remedy. Excavated soil and drill cuttings generated as a result of remedy construction activities would be disposed of at an EPA-approved off-site facility.

    The operation and maintenance part of this alternative will include the operation and maintenance of the SVE system, carbon exchange, condensate disposal, sampling, monitoring, maintenance of the ICs, and reporting.

- Containment Components

    The capping component will consist of maintaining the existing pavement at OU-1 in order to improve SVE effectiveness and prevent direct contact with contaminated soils until cleanup levels are achieved. The existing pavement is considered sufficient, and no new cap needs to be constructed.

- Institutional Controls (ICs) Components

  ICs would be implemented to ensure that the existing pavement is maintained free of cracks, fractures, and holes. To the extent reasonably practicable, the ICs will be implemented either through recorded land use covenants that are negotiated with the landowners (and which will run with the land), or, if such negotiations are not successful, through special building or other permit restrictions enacted by the appropriate municipal authority in this area, or some combination of both. Under CERCLA, EPA has the authority to require that ICs set forth in this ROD are implemented. It is expected that appropriate ICs would remain in place until such time as EPA deems the OU-1 soils remedy complete.

The estimated total cost to implement Alternative 2 is $5.6 million (present worth), including $2.1 million in capital costs and $3.5 million in operation and maintenance costs (present worth). The estimated additional costs for hot air injection and DPE are $0.9 million and $2.9 million, respectively. The estimated time of operation for this alternative is 5 years. These costs are order-of-magnitude engineering estimates with an accuracy expectation of +50% to -30% of the actual remedy costs. The net present value of the remedy was calculated using a 7% discount rate; because of the short remedy duration, the costs are not adjusted for inflation. The same cost estimating methodology was used for all alternatives.

2.9.1.3 Alternative 3 – Hot Spot Excavation/SVE/Partial Capping /ICs

- Treatment Components

  The treatment components for this alternative are essentially the same as those for Alternative 2 (i.e., SVE with, if necessary, enhancements; and treatment of soil vapors prior to discharge to the atmosphere). Additionally, excavated soil will be treated off-site.

  The area with the most contaminated soils (greater than 10 milligrams of PCE per kilogram of soil) above the 30-foot unit would be excavated and transported to an EPA-approved off-site hazardous waste treatment and disposal facility. This trigger concentration was selected based on an evaluation of all soil data; excavation of soils with PCE concentrations above this level can be reasonably implemented.

  Excavation would occur on the former Omega property in a 5,000-square-foot area south and west of the building currently housing Star City Auto Body. The excavation would include removal and replacement of all existing pavement in this area. Excavated soil would be transported to an offsite landfill for treatment and subsequent disposal. The excavated area would be backfilled with clean soil and repaved.

- Containment Components

  The capping component would be the same as for alternative 2.

- Institutional Controls Components

  The ICs components for this alternative are the same as those for Alternative 2.

The estimated total cost to implement this alternative is $8.6 million (present worth), including $5.1 million in capital costs and $3.5 million in operation and maintenance costs (present worth). The estimated additional costs for hot air injection and DPE are $0.9 million and $2.9 million, respectively. The estimated time of operation for this alternative is 5 years.

2.9.1.4 Alternative 4 – Thermally-Enhanced SVE/Partial Capping/ICs

- Treatment Components

  This alternative includes all the components of Alternative 2, with the addition of thermal enhancement by electrical resistive heating (ERH). ERH increases the effectiveness of SVE by increasing the temperature of contaminated soils and thus the VOC levels in soil gas, thereby enabling the SVE system to remove more VOC contaminant mass in a shorter period of time.

- Containment Components

  The capping component would be the same as for Alternative 2.

- Institutional Controls Components

  The ICs components for this alternative are the same as those for Alternative 2.

The estimated total cost to implement this alternative is $16 million (present worth), including $9.5 million in capital costs and $6.5 million in operation and maintenance costs (present worth).

The estimated time of operation for this alternative is one year. An additional six months are assumed to verify remediation via rebound testing, for a total remediation time of 1.5 years.

2.9.2 Common Elements and Distinguishing Features of each Alternative

Alternatives 2, 3, and 4 (action alternatives) have certain key ARARs in common, including

- SCAQMD limits on emissions to the air from the soil vapor treatment system;
- DTSC and other state regulations regarding managing hazardous wastes (including soil vapor, excavated soil and soil cuttings); and
- State regulations regarding land use covenants.

All the action alternatives include incidental trenching and drilling, and require the disposal of contaminated soil. Compared to Alternatives 2 and 4, which only include trenching and drilling, Alternative 3 would generate a much larger volume of contaminated soil for off-site disposal (approximately 2,700 cubic yards) as a result of hot spot excavation.

Alternatives 2, 3, and 4 are all expected to be reliable over the long term, and all three have similar design and construction time frames. Alternatives 2 and 3 would achieve cleanup levels that allow for residential (i.e., unrestricted) use of the land in OU-1 within roughly five years, whereas Alternative 4 would achieve those cleanup levels faster (i.e., within approximately 18 months).

Alternatives 2, 3 and 5 differ significantly in terms of estimated total cost, ranging from $5.6 million for Alternative 2 to $16 million for Alternative 4 (numbers cited are total present worth costs using a discount rate of 7%).

2.10 Comparative Analysis of Alternatives

This section summarizes the comparative analysis of alternatives that is presented in the detailed analysis section of the Feasibility Study report (CDM, 2008). The analysis is presented for each of the nine criteria specified in the NCP and is also summarized in Table 9, in which each alternative is compared to the other three and rated "low", "medium", or "high" with respect to the nine criteria. A high rating is most favorable and a low rating is least favorable. Rather than rating costs, the estimated costs for each alternative are presented.

2.10.1 Comparative Analysis

Overall Protection of Human Health and Environment

This criterion addresses whether an alternative provides adequate protection of human health and the environment, and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, and/or ICs. Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

All the action alternatives would achieve cleanup goals. All of the action alternatives are protective of human health and the environment by eliminating, reducing, or controlling risks posed by the site through treatment of soil contaminants, engineering controls, and/or institutional controls. All three action alternatives would remove contaminants from soils by SVE; Alternative 3 would additionally remove contaminants by excavation of soil and destroy the contaminants by off-site treatment of the excavated soil. For all the action alternatives, ICs would provide restrictions on activities that might increase exposures to contaminated soils or soil vapor. All three action alternatives would provide equal protection of groundwater at OU-1 from the vadose zone soil contamination.

Compliance with ARARs

Section 121(d) of CERCLA and NCP §300.430(f)(1)(ii)B require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those State standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or provides a basis for invoking a waiver.

All alternatives, except the No Action alternative, had identical ARARs associated with the design, construction and operation of the remedies proposed in each such alternative. The off-site disposal of contaminated soil under Alternative 3 is subject to the same off-site legal requirements that address the handling and disposal of drill cuttings and soil excavated from trenches, etc., during construction of the SVE system, which are components of Alternatives 2, 3 and 4. Acquisition of permits would not be necessary for on-site treatment operations, although the remedy will comply with the substantive requirements of applicable permits.

All alternatives would comply with their respective Federal and State ARARs.

2.10.1.1 Long-Term Effectiveness and Permanence

This criterion refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes consideration of residual risk that will remain on-site following remediation and the adequacy and reliability of controls.

Each alternative, except the No Action alternative, provides a high level of long-term protection. Alternative 4 is expected to achieve lower levels of residual VOC concentrations than Alternatives 2 or 3, although all three of these alternatives are expected to fully achieve the RAOs and meet cleanup levels. The institutional controls associated with Alternatives 2, 3 and 4 are expected to be reliable and adequate during their expected relatively short life-time (5 to 6 years).

Reduction of Toxicity, Mobility, or Volume through Treatment

This criterion refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Because each of the three action alternatives has an SVE system that incorporates soil vapor treatment, each provides a similar degree of reducing toxicity, mobility, and volume through treatment. Contaminants would be permanently removed from OU-1 via the vapor treatment process, although Alternative 3 would also remove contaminants from OU-1 via excavation, offsite ex-situ treatment, and offsite disposal.

Short-Term Effectiveness

This criterion addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers and the community during construction and operation of the remedy until cleanup goals are achieved.

Alternatives 2, 3, and 4 would be effective in the short term because they all would begin reducing contaminant soil concentrations upon startup. There would be potential risks to construction workers during excavation and treatment of soil, primarily associated with equipment movement and exposure to contaminated dust and volatile organic emissions. However, air monitoring within OU-1, and at the boundaries of OU-1, and engineering controls would control the potential for exposure. Use of appropriate PPE and dust suppression measures throughout the remedy construction would provide an effective short-term solution to human exposure. These short-term risks would be increased for Alternative 3 due to the hot spot soil excavation and ex situ treatment. Similarly, there would be some short-term risks associated with Alternative 4 related to setting up the electrical supply system that would be needed to elevate the subsurface temperature.

Alternatives 2, 3, and 4 would require approximately one year for design, coordination with governmental permitting agencies, construction, and startup. (The construction effort for Alternatives 3 and 4 would be expected to require approximately one-month longer than for Alternative 2.) Once operational, Alternative 4 would require the least amount of time to achieve cleanup levels (one year of operation). Alternatives 2 and 3 would each require approximately five years of operation.

For alternatives 2, 3, and 4, after initial remediation, soil vapors that evaporate from residual contamination might rebound to levels that would require pulsed operation of the SVE system for an additional six months. Pulse testing will be required for the three action alternatives to verify that the cleanup levels have been achieved.

For all three action alternatives, fugitive dust emissions from the construction of the remediation building and trenching activities and from the excavation could potentially impact workers, nearby businesses, the community, and the environment during implementation and, therefore, would be controlled and monitored during construction. Due to the much larger excavation component, Alternative 3 would have the greatest potential for producing fugitive dust emissions.

Implementability

This criterion addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, coordination with other governmental entities, as well as other factors, are also considered.

The SVE aspects of all three alternatives can be readily implemented with available and proven technologies. Construction and O&M of SVE systems have been implemented at many similar sites and utilize well-proven technologies. The systems could require periodic replacement of pumps, piping, and vessels that comprise the SVE and vapor treatment systems. For all three action alternatives, installation of some of the SVE wells and piping would require access over surrounding property. It is expected that such access will be obtained through landowners' written agreement. Table 10 provides estimates for the durations of various aspects of implementing Alternatives 2, 3, and 4.

Alternative 3 would rate lower than Alternative 2 for implementability due to the need to shore during soil excavation and the need to protect nearby buildings. Worker protection would also be an issue during excavation due to the high VOC concentrations in soil that would likely be encountered. Provisions would need to be made to protect against VOC vapors migrating from the excavation to neighboring properties.

Compared with Alternatives 2 and 3, Alternative 4 would involve several implementation issues. Providing the significant amount of energy needed to heat the subsurface and getting this energy safely to the electrodes would be significantly more difficult (more expensive and intrusive) compared to traditional SVE construction and operation. In addition, the system would need to be protective of nearby buildings and sub-grade utilities. This alternative would require significantly more boreholes for electrodes and SVE wells, and these would need to be properly abandoned following remediation.

Cost

This criterion evaluates the estimated capital, O&M, and indirect costs of each alternative.

A summary of the costs for all alternatives is shown in Table 9. The estimated present worth costs for the action alternatives ranged from $5.6 million (Alternative 2) to $16.0 million (Alternative 4). Alternative 3 is estimated to have a present worth cost of $8.6 million. Additional present worth costs estimated for the two SVE enhancements for Alternatives 2 and 3 - hot air injection and DPE - are $0.9 million and $2.9 million, respectively, and are included in the costs shown in Table 9. Detailed cost breakdowns for the three alternatives are included in a series of cost worksheet tables in the FS.

2.10.1.2 State Acceptance - indicates whether the state agrees with, opposes, or has concerns about the preferred alternative.

DTSC, the lead state agency, has reviewed the RI report, the HHRA, the FS report and the Proposed Plan and concurs with Alternative 2 (soil vapor extraction, partial capping and ICs) as the selected remedy.

Community Acceptance - includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose.

The Proposed Plan was presented and discussed at a public meeting held on June 24, 2008 in Whittier. The community did not indicate any significant concerns regarding the proposed remedy. The Responsiveness portion of this ROD addresses the comments received on the Proposed Plan during the public comment period.

2.10.2 Summary of Comparative Analysis

A summary of the comparative analysis of alternatives, which highlights differences among alternatives in meeting the nine criteria, is presented in Table 9. This table shows that Alternative 2 (SVE/Partial Capping/ICs) ranked the highest of the four alternatives analyzed using the nine criteria.

Alternative 3 (Hot Spot Excavation/SVE/Partial Capping/ICs) ranked lower than Alternative 2 due the short-term risks associated with hot spot excavation. Alternative 3 was also more costly due the expense of excavating the hot spot soils and the subsequent transportation, treatment and disposal of excavated soils at a Class I landfill.

Alternative 4 (Thermally-Enhanced SVE/Partial Capping/ICs) remediated the soils faster compared to Alternative 2 (1.5 years compared to 5.5 years); however, there was considerable cost associated with the time savings ($16.0 million compared to $5.6 million). In addition, there are significant implementation issues associated with Alternatives 3 and 4, which added to a lower ranking compared to Alternative 2.

2.11 Principal-Threat Wastes

EPA investigated OU-1 for contamination in various media including soil, soil gas, indoor air, and groundwater; however, soil is the source medium of primary concern for cleanup remedies to be selected in this ROD. The investigation showed that PCE is the most prevalent contaminant at the Omega Site. As a result, PCE was the primary contaminant considered in developing the alternatives for cleaning up OU-1, although the same alternatives also address the other contaminants found at OU-1. PCE is the primary contributor to total cancer and non-cancer risks at OU-1. Potential non-cancer health effects from exposure to PCE could include damage to liver, kidney, heart, and skin. The contaminated soil is also a continuous source of contamination in groundwater.

In general, principal-threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. At OU-1, the vadose zone soils are considered principal threat wastes because they contain high concentrations of chemicals of concern that are potentially highly mobile due to volatilization and present a risk to human health should exposure occur. The main exposure route is the subsurface transport of VOC vapors into buildings. The calculated cancer risks to future residents range up to 4×10^{-3} (above the acceptable range of 10^{-6} to 10^{-4}). The Hazard Index for future residents, representative of potential non-cancer adverse health effects, is up to 108 (above the threshold of 1).

To address the OU-1 soil contamination, four remedial alternatives were developed from the list of retained technologies. Each of the three action alternatives would include an SVE system that incorporates soil vapor treatment. Therefore, each of these three alternatives would address principal threat wastes through treatment, with contaminants being permanently removed from OU-1 via the soil vapor extraction and treatment process. Alternative 3 would also address principal threat waste by removing contaminants from OU-1 via soil excavation, offsite ex-situ treatment, and offsite disposal.

2.12 Selected Remedy

2.12.1 Summary of the Rationale for the Selected Remedy

Alternative 2 (SVE/Partial Capping/ICs) is the selected remedy for OU-1 vadose zone soils. It ranked higher in short-term effectiveness and implementability than Alternative 3 because of the risks and difficulties associated with hot spot excavation. Alternative 2 is significantly less costly than Alternatives 3 or 4 while still achieving cleanup levels in a reasonable period of time. Although Alternative 4 would achieve cleanup levels faster than Alternative 2 (1.5 years compared to 5.5 years), there would be considerable additional costs associated with achieving those time savings (even if it were necessary to employ hot air injection and/or dual phase extraction as part of Alternative 2). There are also significant implementation issues associated with Alternative 4. Alternative 2 provides the best balance of tradeoffs with respect to the balancing and modifying criteria, and EPA has chosen it as the selected remedy.

2.12.2 Description of the Selected Remedy

Alternative 2 would use a network of SVE wells and a treatment system to remove and treat contaminated soil vapors from below the ground surface (see Figure 10). The SVE component would include installation and operation of both shallow and deep extraction wells in the vadose zone, which remove contaminated soil vapor. Soil vapors would be treated by passing them through a GAC filter to remove contaminants so that the treated air complies with the limits specified by the SCAQMD before being released to the atmosphere. Condensate from the SVE system would be pumped to the groundwater treatment system on the former Skateland property, which is part of the interim groundwater remedy.

SVE wells would be installed on the former Omega and Skateland properties, and on the adjacent Terra Pave property to the southwest. The FS report presents a suggested configuration of the SVE well network, based in part on a pilot test conducted during the FS, but the actual number and locations of these wells could change during remedial design.

Following the startup, the system will be optimized for maximum VOC mass removal. The optimization will include altering the wellhead pressures, and adding extraction wells and/or passive injection wells. These actions will prevent the occurrence of stagnation zones with minimal soil gas movement and increase soil gas movement through zones of highly contaminated soil.

After the optimization, the system will be operated until asymptotic VOC mass removal rates have been achieved at each extraction well. Periodic rebound testing will then be performed to assess the VOC concentrations that occur after the system has been shut down for an extended period of time (e.g., for more than a week). The periodic operation and testing will continue if the post-rebound concentrations exhibit a decreasing trend. If the post-rebound VOC concentrations within the upper 30 feet of soil (from the ground surface to 30 feet below) remain above the cleanup levels for soil gas and/or the VOC concentrations in the lower 30 feet of soil (approximately between the depths of 40 and 70 feet) remain above the cleanup levels protective of groundwater, it means that the SVE system alone can not achieve the cleanup goals and contingencies for increasing the effectiveness of SVE, including hot air injection and/or DPE, will be implemented.

Hot air increases the effectiveness of SVE by causing additional vapors to be released from the soil. DPE consists of simultaneous soil vapor and groundwater extraction and would be used if sampling data indicate that vapors coming from the groundwater are preventing the SVE system from achieving the cleanup goals. DPE would also be used to prevent water table rise, if necessary. Water generated from DPE would be pumped to the groundwater treatment system on the former Skateland property.

If the post-rebound VOC concentrations remain above the cleanup levels and the system performance indicates that the bulk of the contaminant mass removed results from the volatilization of VOCs from groundwater, and/or if it becomes necessary to prevent water table rise, then DPE will be implemented as a contingency. If the system performance indicates that high post-rebound VOC concentrations (above the cleanup levels) result from contamination persisting in pockets of fine-grained soil, then hot air injection will be implemented as a contingency.

As part of the selected remedy, ICs would be implemented to require that the existing pavement be maintained during the operation of the SVE system. To the extent reasonably practicable, these will be implemented through land use covenants negotiated with the landowners, which will run with the land, or, if such negotiations are unsuccessful, through special building or other permit restrictions negotiated with and enacted by the municipal authority in this area, or some combination of both. Under CERCLA, EPA has the authority to require that ICs set forth in this ROD are implemented. It is anticipated that the PRPs implementing the remedy will be responsible for maintaining the ICs, and regular monitoring (e.g., monthly) for the overall integrity of the surface cover and of any activities that may affect the ICs. It is expected that appropriate ICs would remain in place until such time as EPA deems the OU-1 soils remedy complete; no ICs will be required afterwards.

2.12.3 Summary of the Estimated Remedy Costs

The estimated total cost to implement this alternative is $5.6 million (present worth), including $2.1 million in capital costs and $3.5 million in O&M costs (present worth). The estimated additional costs for hot air injection and DPE are $0.9 million and $2.9 million, respectively. The estimated time of operation for this alternative is 5 years. The estimated overall duration of the remedy, from design to closure, is seven years.

Table 11 shows the summary of capital, O&M, and annual costs for the expected duration of the remedy operation, and net present value analysis based on a 7% discount rate.

These costs are order-of-magnitude engineering estimates with an accuracy expectation of +50% to -30% of the actual remedy costs. The cost estimates will be further refined during the design and implementation of the remedy. The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes would be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Differences, or a ROD amendment.

2.12.4 Expected Outcomes of the Selected Remedy

The selected remedy is expected to achieve cleanup levels that allow unrestricted use of the properties at OU-1 within five years after startup of the SVE system.

The vadose zone cleanup levels are expected to prevent the influx of VOCs into groundwater at levels that would result in an increase in VOC concentrations in groundwater greater than the drinking water limits. This outcome is expected within five years.

The purpose of this response action is to control risks posed by direct contact with soil, inhalation of VOC vapors, and to minimize migration of contaminants to groundwater. The results of the baseline risk assessment indicate that existing conditions at the site pose a potential excess lifetime cancer risk of 4.0×10^{-5} (RME) to future residents (adult plus child) from direct contact with contaminated soils and maximum of 5.0×10^{-3} from inhalation of VOC vapors (i.e., 98% of the total potential risk is from inhalation and 2% from direct contact with soil). The risks to future commercial/industrial workers are 1.0×10^{-5} for direct contact and 5.0×10^{-4} for inhalation (i.e., 96% of the total potential risk is from inhalation and 4% from direct contact with soil). The inhalation pathway represents much greater risk than direct exposure (dermal contact and ingestion) to the contaminated soil. PCE is the main risk driver because it accounts for 91% of the potential inhalation risk to future residents (adult and child). Table 12 lists primary COCs that account for 99.5% of the risk from inhalation.

This remedy shall address all vadose zone soils contaminated with PCE in excess of 1.2 mg/kg and 470 μg/L (soil gas), which would correspond to an excess lifetime cancer risk of 10^{-6} (Table 12). Since no Federal or State ARARs exist for soil, the action levels for soil were determined through a site-specific risk analysis. These soil cleanup levels are protective at the 10^{-6} excess cancer risk level for PCE, the cancer risk driver for OU-1. The vadose zone shall be monitored to ensure that cleanup levels are achieved. Implementation of the OU-1 remedy is expected to result in a cleanup level for Omega-related contaminants that allows for unrestricted land use within OU-1 and the adjacent area.

The selected remedy is expected to have the following socio-economic and community revitalization impacts:

- increased property values within OU-1 and also in the vicinity;
- jobs created as a result of the remedy implementation and redevelopment of the properties; and
- increased tax revenues due to redevelopment.

2.13 Statutory Determinations

Under CERCLA Section 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), and are cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and has a bias against offsite disposal of untreated wastes.

2.13.1 Protection of Human Health and the Environment

The selected remedy, Alternative 2, will protect human health and the environment through the treatment of VOC-contaminated soil by using soil vapor extraction and treatment system and the implementation of institutional controls to maintain paved areas and limit excavation during operation of the SVE system. Reducing the VOC levels in soil reduces the threat of exposure via ingestion, dermal contact, and inhalation by human receptors, and it also reduces the potential for contaminant migration to groundwater. The risks from exposure to VOCs will be reduced to within the EPA target carcinogenic risk range of $1x10^{-4}$ to $1x10^{-6}$ and the noncarcinogenic exposure levels will be reduced to below the HI of 1. The implementation of the selected remedy will not pose unacceptable short-term risks or cross-media impacts.

2.13.2 Compliance with Applicable or Relevant and Appropriate Requirements

Remedial actions selected under CERCLA must comply with ARARs under federal environmental laws or, where more stringent than the federal requirements, state environmental or facility siting laws. Where a state has been delegated to be the authority to enforce a federal statute, such as RCRA, the delegated portions of the statute are considered to be a federal ARAR unless the state law is broader in scope than the federal law.

There are three categories of ARARs: 1) chemical-specific requirements, 2) location-specific requirements, and 3) action-specific requirements. Where there are no chemical-, location-, or action-specific ARARs, EPA could consider non-promulgated federal or state advisories and guidance as to-be-considered (TBC) criteria. Although consideration of TBC criteria is not required, cleanup levels based on TBCs are legally enforceable as performance standards.

A summary of ARARs and TBC criteria for the selected remedy is presented in Table 8.

2.13.3 Cost-Effectiveness

In the judgment of EPA, the selected remedy is cost effective and presents a reasonable value. According to the NCP, a remedy is cost effective if its costs are proportional to its overall effectiveness. The overall effectiveness of the selected remedy was demonstrated in the comparative analysis of the alternatives. The selected remedy satisfies the threshold criteria (overall protectiveness and compliance with ARARs), while ranking high with respect to the three balancing criteria of long-term effectiveness, reduction of toxicity, mobility, and volume through treatment, and short-term effectiveness.

The overall effectiveness of the alternatives was also evaluated with respect to the respective cost estimates. A cost-effectiveness matrix is provided in Table 13. Because the selected remedy provides effective and permanent solutions in a relatively short time-frame, the overall cost of implementation might be higher or lower relative to a less effective alternative.

2.13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy represents the maximum extent to which permanent solutions and alternative treatment technologies can be used in a practical manner to remediate vadose zone soils at OU-1. As shown in Table 9, the selected remedy satisfies the threshold criteria of overall protection and compliance with ARARs, while compared favorably with respect to the five balancing criteria. An evaluation of the selected remedy with respect to balancing and modifying criteria follows.

Long-term Effectiveness and Permanence. The selected remedy is expected to fully achieve the RAOs and meet cleanup levels. The institutional controls associated with the selected remedy are expected to be reliable and adequate. Alternative 4 is expected to achieve lower levels of residual VOC concentrations than alternatives 2 or 3, although all three of these alternatives are expected to fully achieve the RAOs and meet cleanup levels. The institutional controls associated with alternatives 2, 3 and 4 are expected to be reliable and adequate during their expected relatively short life-time (5 to 6 years or less).

Reduction of Toxicity, Mobility, or Volume through Treatment. Soil vapor extraction will permanently and effectively reduce the volume of VOC contamination in soil. Contaminants removed from OU-1 will be permanently destroyed via the vapor treatment process. Because each of the three action alternatives has an SVE system that incorporates vapor treatment, each provides similar degree of reducing toxicity, mobility, and volume through treatment. Contaminants would be permanently removed from OU-1 via the vapor treatment process. Alternative 3 would also remove contaminants from OU-1 via excavation, offsite ex-situ treatment, and offsite disposal.

Short-term Effectiveness. Site-specific cleanup levels are expected to be achieved in a reasonable timeframe. The estimated treatment time for soil vapor extraction is 5 years. After initial operation of the SVE system, soil vapors might "rebound" to levels that would require pulsed operation of the system. Appropriate health and safety measures must be adhered to during the remedial action. Alternatives 2, 3, and 4 would be effective in the short term because they all would begin reducing contaminant soil concentrations upon startup. There would be some short-term risks associated with the hot spot soil excavation and ex situ treatment for Alternative 3. Similarly, there would be some short-term risks associated with Alternative 4 related to setting up the electrical supply system that would be needed to elevate the subsurface temperature.

Implementability. The selected remedy is technically feasible and implementable. All material and equipment is commercially available. Alternative 3 would be more difficult to implement than Alternative 2 but would not be more effective in terms of cleanup time and reduction of toxicity. Alternative 4 would result in faster cleanup than Alternative 2 but would be significantly more difficult to implement.

Costs. The selected remedy is cost effective. The estimated net present worth is $5.6 million. Alternative 3 would be more costly than Alternative 2 but would not be more effective in terms of cleanup time and reduction of toxicity. Alternative 4 would result in faster cleanup than Alternative 2 but at a significant increase in cost. Alternative 2 is less costly than

Alternatives 3 and 4 even with the implementation of the contingencies (hot air injection and DPE).

State Acceptance. DTSC concurs with the selected remedy.

Community Acceptance. The community has not indicated any significant concerns regarding the selected remedy. It is reasonable to expect potential community concerns over the excavation component of Alternative 3 and the electrical component of Alternative 4.

2.13.5 Preference for Treatment as a Principal Element

The remedy satisfies the statutory preference for treatment as a principal element of the remedy (that is, it reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment). Treatment is a major component of the selected remedy.

The source material considered principal threat wastes at OU-1 are the vadose zone soils that contain mainly VOC contamination as vapors in the pore space, dissolved in pore water, sorbed to the soil particles, and possibly also as DNAPL droplets. The three action alternatives would include an SVE system that incorporates soil vapor treatment. The SVE component of the action alternatives would reduce the mobility and volume of the principal threat wastes. The soil vapor treatment component of the action alternatives would reduce the toxicity of the principal threat wastes through treatment, with contaminants being permanently removed from OU-1 via the soil vapor extraction and treatment process. Alternative 3 would also address principal threat wastes by removing contaminants from OU-1 via soil excavation, offsite ex-situ treatment, and offsite disposal.

2.13.6 Five-Year Review Requirements

CERCLA Section 121(c) and NCP Section 300.430(f)(5)(iii)(C) require a five-year review if a remedial action results in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure. Because it is anticipated that, after completion of the remedial action, contaminant levels at OU-1 will allow for unlimited use and unrestricted exposure, is not expected that a statutory five-year review will be required. However, it is EPA policy to prepare a five-review if it takes longer than five years to attain RAOs and cleanup levels. Consequently, a policy review will be conducted within five years of the date that construction is completed at OU-1, to ensure that the remedy is, or will be, protective of human health and the environment.

2.14 Documentation of Significant Changes from Preferred Alternative of Proposed Plan

The Proposed Plan for Omega Site OU-1 was released for public comment in June 2008. The Proposed Plan identified Alternative 2 – Soil Vapor Extraction and Institutional Controls as the preferred alternative for vadose zone remediation. EPA reviewed all comments submitted during the public comment period. It was determined that no significant changes to the remedy as identified in the Proposed Plan were necessary or appropriate.

3.0 Part 3: Responsiveness Summary

3.1 Stakeholder Issues and EPA Responses

During the public comment period for the Proposed Plan, EPA received written comments from the Omega Chemical Site PRP Organized Group (OPOG) and Aaron Terry. Mr. Terry's father, John Terry, owns property adjacent to the former Omega facility and operates a business (Terra Pave, Inc.) on that property. The selected remedy includes construction and operation of soil vapor extraction wells, restrictions on excavation, and maintenance of existing pavement on the Terra Pave property during implementation of the remedy.

3.1.1.1 Comments from OPOG

OPOG's comments and corresponding EPA responses are as follows.

Comment 1 - Use of the Property and Applicable Cleanup Goals: The ultimate selection of cleanup goals for the site should be based, in part, on future land use. Page 2 of the Proposed Plan accurately states that the current use of the property is for commercial/industrial purposes and the current zoning also allows for residential land use. As a result, the Final Feasibility Study (FS) presents site-specific PRGs based on both commercial and residential receptors. Although the FS contemplates establishment of cleanup goals that are protective of human health under residential land use, if the zoning is changed or enforceable institutional controls enacted to specify only commercial and/or industrial land use, the final cleanup goals should be modified accordingly. This clarification should be noted in the Record of Decision (ROD).

> **Response**: EPA has agreed to re-evaluate the need for residential cleanup goals in the event that zoning is changed to prohibit residential use of the OU-1 area. However, the current residential cleanup goals are consistent with the current zoning which allows for residential land use, and EPA's broader goal of unrestricted future land use. The time and costs to achieve residential cleanup goals are not expected to be significantly greater than to achieve commercial/industrial cleanup goals. Note that only the upper 30 feet of the vadose zone would be subject to residential cleanup goals. See Section 2.6 (Current and Potential Future Land and Water Uses) and 2.7 (Summary of Site Risks) of the Decision Summary for additional discussion of this issue.

Comment 2 - Remedial Action Objectives (RAOs): Page 3 of the Proposed Plan lists three RAOs, including the goal of reducing or eliminating contaminant migration to levels protective of groundwater. Groundwater at the site is currently not being used for any beneficial purposes, and potential groundwater risks from Operable Unit 1 (OU-1) are being mitigated through a separate EE/CA. Although not stated in the Proposed Plan, OPOG understands that during the remedy design/remedial action phase, cleanup goals will be developed for vapor concentrations in deep vadose-zone soils that will be protective of groundwater. In addition to developing the cleanup goals, an analysis will be conducted to determine the equilibrium level between VOCs in groundwater and their respective soil vapor concentrations. This analysis will assist in determining when the system has effectively mitigated soil concentrations to levels that are not a source to groundwater.

> **Response**: The third Remedial Action Objective (RAO) will be achieved by reducing soil and soil vapor concentrations to levels that will be protective of the highest beneficial use of the groundwater under OU-1, as determined by the Regional Water Quality Control Board. The specific cleanup levels to achieve the third RAO will be determined during Remedial Design, and reflected in a future groundwater ROD that selects a remedy for OU-1 groundwater. In the event that the final groundwater remedy covering OU-1 does not require cleanup to achieve the groundwater's highest beneficial use (i.e., drinking water), the cleanup levels for soil with respect to the third RAO will be revised to be consistent with such final groundwater remedy. See Section 2.8 (Remedial Action Objectives) of the Decision Summary for additional discussion of the RAOs.

Comment 3 - Contingent Technologies: As described on Page 4 of the Proposed Plan, the [preferred] Alternative (Alternative 2) includes contingencies for potential enhancement of the SVE system. Hot air injection and dual-phased extraction (DPE) are noted and costed as the potential contingent options. However, it should be noted that, prior to the evaluation of any continent (sic) technologies, optimization of the SVE system will be undertaken, if necessary, as described in Section 5.2.6 of the FS. If after reasonable optimization efforts have been completed, it is determined that contingent measures are necessary, then appropriate contingent technologies will be evaluated during the operational phase of remedy implementation.

> **Response**: EPA concurs with the comment and agrees that optimization as described in the FS should take place prior to implementing contingent technologies. See Section 2.9 (Description of Alternatives) of the Decision Summary for additional discussion of optimization and contingent technologies.

3.1.1.2 Comments from Mr. Terry

Mr. Terry's comments and corresponding EPA responses are as follows.

Comment 1: There is an operating business (Terra Pave, Inc.) within the "Operable Unit 1". The heath (sic) and safety of its occupants are of utmost concern.

> **Response:** EPA concurs with the comment. The selected remedy will be protective of workers at businesses impacted by contamination from the site.

Comment 2: Disruption/access to the operating business must be addressed as many proposed vapor extraction wells are located on the [Terra Pave] property.

> **Response:** EPA concurs with the comment. EPA expects that the OU-1 PRPs will design, construct, and operate the remedy in a manner that minimizes impacts on local businesses. The details of how this will be achieved will be spelled out in the access agreements between certain property owners and the PRPs. The OU-1 PRPs will negotiate access with the OU-1 property owners in order to implement the remedy. Avoidance of unreasonable disruptions to businesses in the immediate vicinity is expected to be addressed as part of that process.

Comment 3: Prior to the cleanup, additional indoor/outdoor air samples and data should be collected for comparison.

> **Response:** Additional indoor and outdoor air sampling on the Terra Pave property occurred on July 23, 2008. EPA is in the process of evaluating the results of that sampling to determine if any interim measures are needed.

Comment 4: Temporary measures as previously discussed (carbon filters, etc.), should be implemented immediately if elevated levels of contaminants are found.

> **Response:** The need for temporary mitigation measures will be evaluated by EPA after our review of the recent indoor air sampling results. The selected remedy is expected to achieve cleanup goals in the long term.

Comment 5: If proposed measures are inadequate in the cleanup, additional measures should be implemented.

> **Response:** If cleanup goals are not met, system optimization and contingent technologies will be evaluated and implemented as necessary in order to assure that cleanup levels are achieved. See Section 2.9 (Description of Alternatives) of the Decision Summary.

3.2 Technical and Legal Issues

3.3 Technical Issues

None identified.

3.4 Legal Issues

None identified.

4.0 References

Agency for Toxic Substances and Disease Registry. 2007. Health Consultation. Evaluation of Indoor Air Migration in Building On-Site and Adjacent to the Omega Chemical Site. March 20.

California Department of Health Services under Cooperative Agreement with the Agency for Toxic Substances and Disease Registry. 2001. Public Health Assessment, Omega Chemical Site. September 5.

City of Whittier, 2005. Whittier Boulevard Specific Plan. Public Hearing Draft. May.

Camp Dresser & McKee Inc. (CDM). 2007a. Final Human Health Risk Assessment for On-Site Soils. November 9.

_____. 2007b. Final On-Site Soils Remedial Investigation Report. November 14.

_____. 2008. Final Feasibility Study for Onsite Soils. May 21.

DiGiulio, D. C. and R. Varadhan, 2001. Development of recommendations and methods to support assessment of soil venting performance and closure. U.S. Environmental Protection Agency, Office of Research and Development, Washington DC, EPA600/R-01/070, 298 p.

United States Environmental Protection Agency (EPA). 1981. *Process Design Manual for Land Treatment of Municipal Wastewater*. EPA 625/1-81-013.

_______. 1989. Risk Assessment Guidance for Superfund, Volume I. Human Health Evaluation Manual. Interim Final. Office of Emergency and Remedial Response. EPA 540/1-89/002.

_______. 1999. A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, EPA540/R-98/031.

______. 2008. Proposed Plan for Soil Cleanup. June.

Tables

TABLE 1
Summary of Primary Chemicals of Concern and Medium-Specific Exposure Point Concentrations
Omega Chemical Corporation Superfund Site

Scenario Timeframe Future
Medium. Surface and Subsurface Soil to 12 feet bgs
Exposure Medium: Surface and Subsurface Soil to 12 feet bgs

Exposure Point	Primary Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Surface/Subsurface	1,1,1-Trichloroethane	0.047	0.047	mg/kg	1 / 2	0.047	mg/kg	Max
	1,1-Dichloroethene	0.0039	0.0039	mg/kg	1 / 2	0.0039	mg/kg	Max
	1,2-Dichloroethane	0.0063	0.0063	mg/kg	1 / 2	0.0063	mg/kg	Max
	Tetrachloroethene	3.2	4.3	mg/kg	2 / 2	4.3	mg/kg	Max
	Trichloroethene	0.028	0.028	mg/kg	1 / 2	0.028	mg/kg	Max

Scenario Timeframe. Future
Medium: Soil Gas - 5 to 6 ft bgs - all parcels
Exposure Medium Indoor Air - Industrial Worker

Exposure Point	Primary Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Indoor Air	1,1,1-Trichloroethane	142	1528800	ug/m^3	18 / 36	352,624	ug/m^3	95% UCL-T
	1,1-Dichloroethene	83	1071900	ug/m^3	34 / 36	659,877	ug/m^3	95% UCL-G assumed
	1,2-Dichloroethane	93	10125	ug/m^3	5 / 36	2,253	ug/m^3	95% UCL-G
	cis-1,2-Dichloroethene	285	36828	ug/m^3	9 / 36	17,957	ug/m^3	UCL-NP
	Tetrachloroethene	949	3390000	ug/m^3	34 / 36	1,225,830	ug/m^3	95% UCL-G assumed
	trans-1,2-Dichloroethene	55	20988	ug/m^3	16 / 35	6,704	ug/m^3	95% UCL-G
	Trichloroethene	328	472560	ug/m^3	34 / 36	184,300	ug/m^3	95% UCL-G
	Trichlorofluromethane (Freon 11)	551	1011600	ug/m^3	34 / 36	485,399	ug/m^3	95% UCL-G

Scenario Timeframe: Future
Medium. Soil Gas - 5 to 30 ft bgs - Former Omega Chemical Property
Exposure Medium Indoor Air - Resident

Exposure Point	Primary Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Indoor Air	1,1,1-Trichloroethane	197	2457000	ug/m^3	58 / 77	553,427	ug/m^3	95% UCL-T
	1,1-Dichloroethene	1528	1905600	ug/m^3	87 / 87	626,769	ug/m^3	95% UCL-G
	1,2-Dichloroethane	32	10125	ug/m^3	24 / 72	2,496	ug/m^3	95% UCL-G
	cis-1,2-Dichloroethene	51	37620	ug/m^3	36 / 76	14,326	ug/m^3	95% UCL-T
	Tetrachloroethene	488	3390000	ug/m^3	87 / 87	1,355,479	ug/m^3	95% UCL-G
	trans-1,2-Dichloroethene	35	24552	ug/m^3	51 / 73	8,064	ug/m^3	95% UCL-G
	Trichloroethene	199	451080	ug/m^3	87 / 87	190,082	ug/m^3	95% UCL-G
	Trichlorofluromethane (Freon 11)	1068	1236400	ug/m^3	87 / 87	430,192	ug/m^3	95% UCL-G

Scenario Timeframe: Future
Medium· Soil Gas - 5 to 30 ft bgs - Other Parcels
Exposure Medium. Indoor Air - Resident

Exposure Point	Primary Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Indoor Air	1,1,1-Trichloroethane	142	251160	ug/m^3	8 / 50	7,744	ug/m^3	95% UCL-G
	1,1-Dichloroethene	486	8910	ug/m^3	55 / 59	729,033	ug/m^3	95% UCL-N
	Tetrachloroethene	12	2101800	ug/m^3	56 / 59	2,101,800	ug/m^3	Max
	trans-1,2-Dichloroethene	673	9900	ug/m^3	3 / 46	9,900	ug/m^3	Max
	Trichloroethene	54	472560	ug/m^3	50 / 58	393,490	ug/m^3	95% UCL-G
	Trichlorofluromethane (Freon 11)	6	1011600	ug/m^3	58 / 59	1,011,600	ug/m^3	Max

Notes.
mg/kg = milligrams per kilogram
ug/m^3 = micrograms per cubic meter
Statistics Maximum Detected Value (Max), 95% UCL of Normal Data (95% UCL-N), 95% UCL of Log-transformed Data (95% UCL-T), Non-parametric (UCL-NP), 95% UCL assuming Gamma distribution (95% G-UCL)

TABLE 2

Summary of Chronic Cancer Risks and Chronic Non-Cancer Hazards - Current Scenarios

Omega Chemical Corporation Superfund Site

Parcel	Receptor: Current Commercial/Industrial Worker (RME)		Exposure Pathway: Surface Soil to 2.2 ft bgs Oral/Dermal/ Inhalation[3]	Indoor Air Inhalation Pathway[1]	Outdoor Air Inhalation Pathway	TOTAL
Three Kings Construction	Total Chronic Cancer Risk	Minimum	1.E-05	*2.E-05*	*2.E-06*	**4.E-05**
		Maximum	1.E-05	*1.E-04*	*2.E-06*	**1.E-04**
	Total Chronic Non-Cancer Hazard	Minimum	0.3	*0.2*	*0.09*	**0.6**
		Maximum	0.3	*1.6*	*0.09*	**2.0**
Star City Auto Body	Total Chronic Cancer Risk	Minimum	1.E-05	*3.E-05*	*2.E-06*	**4.E-05**
		Maximum	1.E-05	*7.E-05*	*2.E-06*	**9.E-05**
	Total Chronic Non-Cancer Hazard	Minimum	0.3	*0.4*	*0.09*	**0.8**
		Maximum	0.3	*7.7*	*0.09*	**8.0**
North - Medlin & Son 12484	Total Chronic Cancer Risk	Minimum	NA[2]	*2.E-05*	NA[2]	**2.E-05**
		Maximum	NA[2]	*5.E-05*	NA[2]	**5.E-05**
	Total Chronic Non-Cancer Hazard	Minimum	NA[2]	*0.14*	NA[2]	**0.1**
		Maximum	NA[2]	*1.0*	NA[2]	**1.0**
North - Medlin North 12476	Total Chronic Cancer Risk		NA[2]	*0.E+00*	NA[2]	**0.E+00**
	Total Chronic Non-Cancer Hazard		NA[2]	*0.08*	NA[2]	**0.08**
West - Terrapave	Total Chronic Cancer Risk	Minimum	NA[2]	*6.E-05*	NA[2]	**6.E-05**
		Maximum	NA[2]	*1.E-04*	NA[2]	**1.E-04**
	Total Chronic Non-Cancer Hazard	Minimum	NA[2]	*0.7*	NA[2]	**0.7**
		Maximum	NA[2]	*1.8*	NA[2]	**1.8**
South - Bishop	Total Chronic Cancer Risk	Minimum	NA[2]	*2.E-05*	NA[2]	**2.E-05**
		Maximum	NA[2]	*5.E-05*	NA[2]	**5.E-05**
	Total Chronic Non-Cancer Hazard	Minimum	NA[2]	*0.2*	NA[2]	**0.2**
		Maximum	NA[2]	*0.6*	NA[2]	**0.6**
South - LA Carts	Total Chronic Cancer Risk	Minimum	NA[2]	*1.E-05*	NA[2]	**1.E-05**
		Maximum	NA[2]	*2.E-05*	NA[2]	**2.E-05**
	Total Chronic Non-Cancer Hazard	Minimum	NA[2]	*0.10*	NA[2]	**0.10**
		Maximum	NA[2]	*1.3*	NA[2]	**1.3**
South - Oncology Care	Total Chronic Cancer Risk	Minimum	NA[2]	*2.E-05*	NA[2]	**2.E-05**
		Maximum	NA[2]	*2.E-05*	NA[2]	**2.E-05**
	Total Chronic Non-Cancer Hazard	Minimum	NA[2]	*0.14*	NA[2]	**0.14**
		Maximum	NA[2]	*0.15*	NA[2]	**0.15**

Notes:

(1) Indoor air inhalation pathway was calculated using measured indoor air data.

(2) Soil and Outdoor air pathways not calculated separately for the parcels

(3) Surface soil risks and hazards for Three Kings Construction and Star City Auto Body are the same for both buildings because there is only one set of soil data for the site.

(4) Outdoor air exposure concentrations calculated from measured outdoor air concentrations.

TABLE 3

Summary of Chronic Cancer Risks and Chronic Non-Cancer Hazards - Future Scenarios

Omega Chemical Corporation Superfund Site

Receptor	Exposure Pathway	PARCEL Site - Former Omega Property (1)				Parcels Other than the Former Omega Property				All Parcels			
		Total Chronic Cancer Risk		Total Chronic Non-Cancer Hazard		Total Chronic Cancer Risk		Total Chronic Non-Cancer Hazard		Total Chronic Cancer Risk		Total Chronic Non-Cancer Hazard	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Future Commercial/Industrial worker	**Surface and Subsurface Soil to 12 ft bgs** – Oral/Dermal/Inhalation									1 E-05	1 E-05	0 3	0 3
Indoor Worker	**Indoor Air (Soil gas 5 to 6 Feet bgs) –** Inhalation Pathway (2)									1 E-06	5 E-04	0 014	7
RME	**Outdoor Air (Soil gas 5 to 6 Feet bgs) - Inhalation Pathway**									3 E-09	1 E-06	0 00003	0 02
	TOTAL									**1.E-05**	**5.E-04**	**0.3**	**6.9**
Future Commercial/Industrial worker	**Surface and Subsurface Soil to 12 ft bgs** – Oral/Dermal/Inhalation									1 E-05	1 E-05	0 3	0 3
Outdoor Worker	**Outdoor Air (Soil gas 5 to 6 Feet bgs) - Inhalation Pathway**									3 E-08	1 E-05	0 0003	0 15
RME	**TOTAL**									**1.E-05**	**2.E-05**	**0.3**	**0.5**
Future Construction Worker	**Surface and Subsurface Soil to 12 ft bgs** – Oral /Dermal, Inhalation of Fugitive Dust	1 E-06	1 E-06	0 8	0 8	1 E-06	1 E-06	0 8	0 8	1 E-06	1 E-06	0 8	0 8
RME	**Outdoor Air (Soil gas 5 to 12 Feet bgs) - Inhalation Pathway - in Excavation (3)**	8 E-09	1 E-06	0 002	0 4	5 E-10	1 E-06	0 0005	0 3	4 E-09	8 E-07	0 0009	0 3
	TOTAL	**1.E-06**	**2.E-06**	**0.8**	**1**	**1.E-06**	**2.E-06**	**0.8**	**1**	**1.E-06**	**2.E-06**	**0.8**	**1**
Future On-Site Resident (4)	**Surface and Subsurface Soil to 12 ft bgs** – Oral /Dermal, Inhalation of Fugitive Dust	2 E-05	2 E-05	0 3	0 3	2 E-05	2 E-05	0 3	0 3				
RME - Adult	**Indoor Air (Soil gas 5 to 6 Feet bgs) –** Inhalation Pathway (2)	3 E-05	3 E-03	0 4	30	3 E-06	4 E-03	0 08	45				
	TOTAL	**5.E-05**	**3.E-03**	**0.7**	**30**	**2.E-05**	**4.E-03**	**0.4**	**45**				
Future On-Site Resident (4)	**Surface and Subsurface Soil to 12 ft bgs** – Oral /Dermal, Inhalation of Fugitive Dust	4 E-05	4 E-05	0 9	0 9	4 E-05	4 E-05	0 9	0 9				
RME - Adult+Child	**Indoor Air (Soil gas 5 to 6 Feet bgs) –** Inhalation Pathway (2)	4 E-05	3 E-03	0 5	38	4 E-06	5 E-03	0 11	57				
	TOTAL	**8.E-05**	**3.E-03**	**1.4**	**39**	**4.E-05**	**5.E-03**	**1.0**	**58**				
Future On-Site Resident (4)	**Surface and Subsurface Soil to 12 ft bgs** – Oral /Dermal, Inhalation of Fugitive Dust	3 E-05	3 E-05	3 2	3 2	3 E-05	3 E-05	3 2	3 2				
RME - Child	**Indoor Air (Soil gas 5 to 6 Feet bgs) –** Inhalation Pathway (2)	2 E-05	1 E-03	0 9	71	1 E-06	2 E-03	0 20	105				
	TOTAL	**4.E-05**	**1.E-03**	**4.1**	**74**	**3.E-05**	**2.E-03**	**3.4**	**108**				

Notes:

(1) For future scenarios there is only one set of soil data for on-site

(2) Indoor air pathway was calculated using soil gas data since future buildings are not expected to have the same characteristics as the current building where indoor air samples were measured

(3) Outdoor air exposure concentrations calculated from soil gas concentrations

(4) Future residential development is unlikely for any area of the site Calculations were only conducted on-site to provide a representative calculation for potential residential exposure

TABLE 4

Cancer Toxicity Data - Oral/Dermal

Omega Chemical Corporation Superfund Site

Primary Chemical of Concern	Oral Cancer Slope Factor		Dermal Absorption Adjustment	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence Cancer Guideline Description	Oral Cancer Slope Factor	
	Value	Units	(1)	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
1,1,1-TRICHLOROETHANE	NA	$mg/kg/day^{-1}$	NA	NA	$mg/kg/day^{-1}$	D	OEHHA	11/30/2006
1,1-DICHLOROETHENE	NA	$mg/kg/day^{-1}$	NA	NA	$mg/kg/day^{-1}$	C	IRIS	11/30/2006
1,2-DICHLOROETHANE	9.1E-02	$mg/kg/day^{-1}$	NA	NA	$mg/kg/day^{-1}$	B2	IRIS	11/30/2006
CIS-1,2-DICHLOROETHENE	NA	$mg/kg/day^{-1}$	NA	NA	$mg/kg/day^{-1}$	D	IRIS	11/30/2006
TETRACHLOROETHENE	5.4E-01	$mg/kg/day^{-1}$	NA	NA	$mg/kg/day^{-1}$	2B	OEHHA	11/30/2006
TRANS-1,2-DICHLOROETHENE	NA	$mg/kg/day^{-1}$	NA	NA	$mg/kg/day^{-1}$			11/30/2006
TRICHLOROETHENE	1.3E-02	$mg/kg/day^{-1}$	NA	NA	$mg/kg/day^{-1}$	2A	OEHHA	11/30/2006
TRICHLOROFLUOROMETHANE (FREON	NA	$mg/kg/day^{-1}$	NA	NA	$mg/kg/day^{-1}$			11/30/2006

Notes:

(1) Dermal absorption adjustment is a combination of the dermal absorption fraction (ABSd) and the gastrointestinal absorption (ABSGI) as presented in Table A3-4.2. = ABSGI/ABSd so the absorbed cancer slope factor = SFo *ABSd/ABSGI

(2) OEHHA considers naphthalene to be a carcinogen by inhalation only, therefore, the oral cancer slope factor is not used in this risk assessment.

EPA-NCEA: USEPA Region III Provisional Peer Reviewed Toxicity Values for Superfund (PPRTV) (EPA 2005b).

IRIS: Integrated Risk Information System (EPA 2005a).

na: Chemical is listed, no value is available

ne: Chemical has not been evaluated by EPA for evidence of human carcinogenicity.

ni: No information available.

$mg/kg/day^{-1}$: milligram per kilogram-day.

TABLE 5
Non-Cancer Toxicity Data - Oral/Dermal
Omega Chemical Corporation Superfund Site

Primary Chemical of Concern	Chronic/ Subchronic	Oral RfD		Dermal Absorption Adjustment	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units	(1)	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
1,1,1-TRICHLOROETHANE	chronic	2 8E-01	mg/kg/day	NA	NA	mg/kg/day			EPA-Region 9	10/01/2004
1,1-DICHLOROETHENE	chronic	5 0E-02	mg/kg/day	NA	NA	mg/kg/day	Liver toxicity	100	IRIS	11/30/2006
1,2-DICHLOROETHANE	chronic	2 0E-02	mg/kg/day	NA	NA	mg/kg/day			EPA-Region 9	10/01/2004
CIS-1,2-DICHLOROETHENE	chronic	1 0E-02	mg/kg/day	NA	NA	mg/kg/day			EPA-Region 9	10/01/2004
TETRACHLOROETHENE	chronic	1 0E-02	mg/kg/day	NA	NA	mg/kg/day	Liver toxicity in mice	1,000	IRIS	11/30/2006
TRANS-1,2-DICHLOROETHENE	chronic	2 0E-02	mg/kg/day	NA	NA	mg/kg/day	Inc serum alkaline phosphatase	1,000	IRIS	11/30/2006
TRICHLOROETHENE	chronic	3 0E-04	mg/kg/day	NA	NA	mg/kg/day			EPA-Region 9	10/01/2004
TRICHLOROFLUOROMETHANE (FREON 11	chronic	3 0E-01	mg/kg/day	NA	NA	mg/kg/day	Survival and histopathology	1,000	IRIS	11/30/2006

Footnotes

(1) Dermal absorption adjustment is a combination of the dermal absorption fraction (ABSd) and the gastrointestinal absorption (ABSGI) as presented in Table A3-4 2 = ABSGI/ABSd
so the absorbed reference dose = RfDo *ABSGI/ABSd

EPA-NCEA USEPA Region III Provisional Peer Reviewed Toxicity Values for Superfund (PPRTV) (EPA 2005b)
HEAST Healht Effects Assessments Summary Tables (EPA 1997b)
IRIS Integrated Risk Information System (EPA 2005a)
na Chemical is listed, no value is available
ni No information available
nl Chemical is not listed
CNS Central Nervous System
mg/kg/day milligram per kilogram per day

TABLE 6

Cancer Toxicity Data - Inhalation

Omega Chemical Corporation Superfund Site

Primary Chemical of Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
1,1,1-TRICHLOROETHANE	NA	$(ug/m^3)^{-1}$	NA	$mg/kg/day^{-1}$	D	IRIS	11/30/2006
1,1-DICHLOROETHENE	NA	$(ug/m^3)^{-1}$	NA	$mg/kg/day^{-1}$	C	IRIS	11/30/2006
1,2-DICHLOROETHANE	2.6E-05	$(ug/m^3)^{-1}$	9.1E-02	$mg/kg/day^{-1}$	B2	IRIS	11/30/2006
CIS-1,2-DICHLOROETHENE	NA	$(ug/m^3)^{-1}$	NA	$mg/kg/day^{-1}$	D	IRIS	11/30/2006
TETRACHLOROETHENE	5.9E-06	$(ug/m^3)^{-1}$	2.1E-02	$mg/kg/day^{-1}$	2B	OEHHA	11/30/2006
TRANS-1,2-DICHLOROETHENE	NA	$(ug/m^3)^{-1}$	NA	$mg/kg/day^{-1}$			11/30/2006
TRICHLOROETHENE	2.0E-06	$(ug/m^3)^{-1}$	7.0E-03	$mg/kg/day^{-1}$	2A	OEHHA	11/30/2006
TRICHLOROFLUOROMETHANE (FREON	NA	$(ug/m^3)^{-1}$	NA	$mg/kg/day^{-1}$			11/30/2006

Notes:

Cal-EPA: Technical Support Document for Describing Available Cancer Potency Factors (OEHHA 2003).

EPA-NCEA: USEPA Region III *Provisional Peer Reviewed Toxicity Values for Superfund* (PPRTV) (EPA 2005b).

IRIS: Integrated Risk Information System (EPA 2005a).

na: Chemical is listed, no value is available.

ne: Chemical has not been evaluated by EPA for evidence of human carcinogenicity.

ni: No information available.

$(ug/m^3)^{-1}$: cubic meter per microgram

$mg/kg/day^{-1}$: milligram per kilogram-day.

TABLE 7

Non-Cancer Toxicity Data - Inhalation

Omega Chemical Corporation Superfund Site

Primary Chemical of Concern	Chronic/ Subchronic	Inhalation RfC Value	Inhalation RfC Units	Inhalation RfD Value	Inhalation RfD Units	Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s) Source(s)	RfC : Target Organ(s) Date(s) (MM/DD/YYYY)
1,1,1-TRICHLOROETHANE	chronic	2 2E+00	mg/m^3	6 3E-01	mg/kg/day			EPA-Region 9	10/01/2004
1,1-DICHLOROETHENE	chronic	2 0E-01	mg/m^3	5 7E-02	mg/kg/day	Liver toxicity	30	IRIS	11/30/2006
1,2-DICHLOROETHANE	chronic	4 9E-03	mg/m^3	1 4E-03	mg/kg/day			EPA-Region 9	10/01/2004
CIS-1,2-DICHLOROETHENE	chronic	3 5E-02	mg/m^3	1 0E-02	mg/kg/day			EPA-Region 9	10/01/2004
TETRACHLOROETHENE	chronic	3 5E-02	mg/m^3	1 0E-02	mg/kg/day			EPA-Region 9	10/01/2004
TRANS-1,2-DICHLOROETHENE	chronic	7 0E-02	mg/m^3	2 0E-02	mg/kg/day			EPA-Region 9	10/01/2004
TRICHLOROETHENE	chronic	6 0E-01	mg/m^3	1.7E-01	mg/kg/day	CNS, eyes		OEHHA	11/30/2006
TRICHLOROFLUOROMETHANE (FREON 1	chronic	7 0E-01	mg/m^3	2 0E-01	mg/kg/day			EPA-Region 9	10/01/2004

Notes:

Cal-EPA Technical Support Document for Describing Available Cancer Potency Factors (OEHHA 2003)

EPA-NCEA: USEPA Region III Provisional Peer Reviewed Toxicity Values for Superfund (PPRTV) (EPA 2005b)

EPA-Region 9 USEPA Region IX PRG Table (EPA 2004c)

IRIS Integrated Risk Information System (EPA 2005a)

na Chemical is listed, no value is available

ni No information available

mg/m^3. milligram per cubic meter.

mg/kg/day milligram per kilogram per day

CNS Central Nervous system

CVS Cadiovascular system

RESP Respiratory system

ALIM Alimentary system

DEV Developmental

TABLE 8
Summary of ARARs for Omega Chemical OU-1 (Soils) Remedy

Authority	Medium	Requirement	Status	Synopsis of Requirement	Action to be Taken to Attain Requirement
CHEMICAL-SPECIFIC CRITERIA					
State Regulatory Requirement	Soil and soil vapor	DTSC Hazardous Waste Regulations, Characteristics of Hazardous Waste Title 22 California Code of Regulations, Division 4.5, Chapter 11 (22 CCR §§ 66261.20, 66261.21, 66261.22, 66261.23, 66261.24)	Applicable	Requires that contaminated media, once extracted for treatment, must be managed as state & federal hazardous waste if such media contains levels of hazardous substances that meet or exceed state and federal hazardous waste criteria.	Excavated soil and drill cuttings generated as a result of remedy construction activities would be disposed of at an EPA-approved off-site hazardous waste treatment and disposal facility
ACTION-SPECIFIC CRITERIA					
State Regulatory Requirement	Soil and soil vapor	California Hazardous Waste Control Law, H&S Code Div. 20, Chap. 6.5, Sections 25100-25250.26 Identification and Listing of Hazardous Waste, 22 CCR Div. 4.5, 22 CCR §§66264.13, §66260.200	Applicable	Establishes hazardous waste control measures. A generator must determine if the waste is classified as a hazardous waste in accordance with the criteria provided in these requirements. Waste characteristics of generated soil will be defined prior to treatment and disposal.	Waste generated by the remedial action would be characterized as hazardous or non-hazardous based upon the methodology in these requirements, e.g., the waste's characteristics.
Federal and State Regulatory Requirement	Soil and soil vapor	Hazardous Waste Regulations, Accumulation Time, 22 CCR §66262.34	Applicable	Allows onsite hazardous waste accumulation for up to 90 days as long as the waste is stored in containers or tanks, on drip pads, inside buildings, is labeled and dated, etc. Substantive provisions are applicable if waste is determined to be RCRA hazardous waste.	Hazardous waste generated as part of remedy construction and accumulated at OU-1 would comply with substantive accumulation provisions.
Federal and State Regulatory Requirement	Soil and soil vapor	Hazardous Waste Regulations, Preparedness and Prevention, 22 CCR Div. 4.5, Chap.14, Art. 3, §§ 66264.30 - 66264.37	Applicable	Contains requirements related to facility design and operation to minimize potential fire, explosion, or unauthorized release of hazardous waste. Substantive provisions are applicable.	The design and operation of the remedy would comply with the substantive provisions of these hazardous waste regulations.

TABLE 8
Summary of ARARs for Omega Chemical OU-1 (Soils) Remedy

Authority	Medium	Requirement	Status	Synopsis of Requirement	Action to be Taken to Attain Requirement
Federal and State Regulatory Requirement	Soil and soil vapor	Hazardous Waste Regulations, Use and Management of Containers 22 CCR Div. 4.5, Chap. 14, Art. 9, §§ 66264.170 - 66264.179	Applicable	Contains requirements related to transferring and storing containers of hazardous waste. Substantive provisions would be applicable to any waste (e.g., soil cuttings and well development) derived in construction of the remedial action. Requirements include maintenance of container and disposal to a Class I hazardous waste disposal facility within 90 days.	Requirements may apply for the storage of contaminated groundwater and sediments trapped by the bag filter during start-up operation.
Federal and State Regulatory Requirement	Soil and soil vapor	Hazardous Waste Regulations, Tank Systems 22 CCR Div. 4.5, Chap. 14, Art. 10, §§ 66264.190 - 66264.200	Applicable	Establishes minimum design standards (i.e., shell strength, foundation, structural support, pressure controls, seismic considerations) for tank and ancillary equipment Substantive provisions are applicable. Includes requirements for minimum shell thickness and pressure controls to prevent collapse or rupture, to prevent a greater environmental hazard than already exists.	Any ancillary equipment and/or tanks used as part of the remedy would meet substantive minimum design standards.
State Regulatory Requirement	Soil and soil vapor	Hazardous Waste Regulations, Miscellaneous Units Requirements 22 CCR Div. 4.5, Chap. 14, Art. 16, 22 CCR §§ 66264.601 - 66264.603	Applicable	Provides minimum performance standards for the location, design, construction, operation, maintenance and closure of miscellaneous equipment to ensure protection of human health and the environment.	The remedy's treatment of hazardous waste through granulated activated carbon (GAC) would qualify as a miscellaneous unit if the resulting contaminated soil vapor condensate constitutes a hazardous waste. Thus, substantive requirements for miscellaneous units may be applicable.
State Regulatory Requirement	Air	South Coast Air Quality Management District (SCAQMD) Regulation IV, Rule 401, Visible Emissions.	Applicable	Prohibits certain types of discharges into the atmosphere from any single source (e.g., air emissions of certain specified opacity).	The remedial action will comply with substantive limits specified in this regulation.

TABLE 8
Summary of ARARs for Omega Chemical OU-1 (Soils) Remedy

Authority	Medium	Requirement	Status	Synopsis of Requirement	Action to be Taken to Attain Requirement
State Regulatory Requirement	Air	SCAQMD Regulation IV, Rule 403, Fugitive Dust	Applicable	Requires that emissions of fugitive dust shall not remain visible in the atmosphere beyond the property line of the emission source. Requires activities conducted in the South Coast Air Basin to use best available control measures to minimize fugitive dust emissions and take necessary steps to prevent the track-out of bulk material onto public paved roadways as a result of their operations.	The remedial action will comply with substantive limits specified in this regulation
State Regulatory Requirement	Air	SCAQMD Regulation IV, Rule 404, Particulate Matter – Concentration	Applicable	Prevents discharge from any source of particulate matter in excess of the concentration standard conditions. Specifically, particulate matter in excess of 450 milligrams per cubic meter (0.196 grain per cubic foot) in discharged gas, calculated as dry gas at standard conditions, shall not be discharged to the atmosphere from any source.	The remedial action will comply with substantive limits specified in this regulation. Soil vapors will be treated by passing them through GAC to remove contaminants so that the treated air complies with the limits before release to the atmosphere.
State Regulatory Requirement	Air	SCAQMD Regulation IV, Rule 1166, VOC Emissions from Decontamination of Soil	Applicable	Regulates excavation and grading around soil containing VOCs, establishes handling requirements for VOC-contaminated soil, and establishes testing methods for measuring excavated soils for VOCs. Applicable to soil excavation, including trenching for system lines. Substantive provisions are applicable.	Any soil grading excavation, or handling of VOC-contaminated soil as part of construction of the remedial action will comply with these requirements
State Regulatory Requirement	Soil and soil vapor	Land Use Covenant, California Civil Code Section 1471, 22 CCR § 67391.1 (a)(1) and (2), (d)	Relevant and appropriate	Provides requirements for land use covenants (LUCs) (e.g., recording the covenant).	Applies to LUCs that likely will be required to maintain the integrity of the paved surfaces within OU-1 during construction and operation and closure of the remedial action.

TABLE 9

Remedial Alternatives Comparative Analysis Matrix

Omega Chemical Corporation Superfund Site

Alternative	1	2	3	4
Description	**No Action**	**SVE & ICs** **5 years O&M**	**Hot Spot Excavation, SVE & ICs** **5 years O&M**	**Thermally-Enhanced SVE & ICs** **1 year O&M**
Overall Protection of Human Health and the Environment	**Low** - no reduction in risk	**High** - Would reduce contaminant concentrations to below the residential OU-1-specific PRGs	**High** - Would reduce contaminant concentrations to below the residential OU-1-specific PRGs	High - Would reduce contaminant concentrations to below the residential OU-1-specific PRGs
Compliance with ARARs	**Low** - Does not meet ARARs	**High** - would meet key ARARs including SCAQMD limits on emissions from the SVE, DTSC and other state regulations regarding managing hazardous wastes and SWRCB antidegradation policy requiring cleanup levels for soils to be protective of beneficial uses of groundwater	**High** - would meet key ARARs including SCAQMD limits on emissions from the SVE, DTSC and other state regulations regarding managing hazardous wastes and SWRCB antidegradation policy requiring cleanup levels for soils to be protective of beneficial uses of groundwater	**High** - would meet key ARARs including SCAQMD limits on emissions from the SVE, DTSC and other state regulations regarding managing hazardous wastes and SWRCB antidegradation policy requiring cleanup levels for soils to be protective of beneficial uses of groundwater
Long-Term Effectiveness and Permanence	**Low** - no reduction in risk	**Moderate** - IC component would maintain the integrity of capped areas	**Moderate** - IC component would maintain the integrity of capped areas	**High** - The thermally enhanced SVE would permanently eliminate the exposure pathways and source of contaminant loading
Reduction of Toxicity, Mobility, or Volume (TMV) Through Treatment	**Low** - would not reduce TMV	**High** - The SVE system would remove and treat contamination from the vadose zone	**High** - Excavation would reduce TMV of waste with ex-situ treatment of the excavated soils prior to disposal in an appropriate landfill	**High** - The thermally enhanced SVE system would remove and treat contamination from the vadose zone
Short-term Effectiveness	**Low** - no reduction in risk	**Moderate** - Use of appropriate personal protective equipment (PPE) and dust suppression measures throughout the remedy construction would provide an effective short-term solution to human exposure	**Moderate** - Use of appropriate personal protective equipment (PPE) and dust suppression measures throughout the remedy construction would provide an effective short-term solution to human exposure	**High** - thermally-enhanced SVE would reach asymptotic conditions and soil concentrations below the OU-1-specific PRGs in one year
Implementability	**High** - Requires no action and is, therefore, easily implemented	**High** - would use common construction techniques and readily available equipment and materials	**Moderate** - excavation would be difficult to implement due to ramp construction and shoring requirements Would require coordination with several tenants to complete Uses known and available technologies	**Moderate** - requires installing a large number of well borings and associated sub-grade piping plus providing a source of the significant amount of electrical power, conveying that power to the subsurface, and protecting nearby buildings and subgrade utilities
Cost ($ in millions)	$0	Capital: $2 10 O&M: $3 50 Total Cost: $5 60 Hot air injection: $0 90 DPE: $2 90	Capital: $5 10 O&M: $3 50 Total Cost: $8 60 Hot air injection: $0 90 DPE: $2 90	Capital: $9 50 O&M: $6 50 Total Cost: $16 00
State Acceptance		DTSC concurs with Alternative 2 (soil vapor extraction, partial capping and ICs) as the selected remedy		
Community Acceptance		The community did not indicate any significant concerns regarding the proposed remedy		

TABLE 10

Estimated Durations for Implementing Alternatives 2, 3 and 4

(Duration in Years)

Alternative	Design/Permitting	Construction/Startup	O&M	Rebound Testing/ Pulsed Operation	Closure Activities[1]	Total
2	0.75	0.25	5	0.5	0.5	7
3	0.75	0.33	5	0.5	0.5	7.08
4	0.75	0.33	1	0.5	0.5	3.08

Note:

[1]Includes Well Abandonment

TABLE 11

COST ESTIMATE SUMMARY - Alternative 2 Partial capping/SVE/ICs

Base Year 2008

CAPITAL COSTS					
Description		**Qty**	**Unit**	**Unit Cost**	**Total Cost**
Contractor Work Plans		1	LS	$61,000	$61,000
Mobilization/Demobilization of Equipment		1	LS	$88,300	$88,300
Permitting		1	LS	$62,000	$62,000
OU1 SVE					
	Shallow SVE Well Installation	10	Each	$9,900	$99,000
	Existing SVE wells upgrade	2	EA	$2,900	$5,800
	Deep SVE Well Installation	6	Each	$15,700	$94,200
	SVE System (includes air/water separator, blower, heater, VGAC unit, all instrumentstion and controls, and treatment building)	1	Each	$694,000	$694,000
	Piping	1	LS	$277,900	$277,900
	Deep VMP Installation	3	Each	$5,800	$17,400
Institutional Controls Package		1	LS	$28,100	$28,100
Hot Air Injection		1	LS	$450,000	$450,000
				SUBTOTAL	$1,878,000
	Contingency (scope and bid)	20%			$375,600
				SUBTOTAL	$2,253,600
	Project Management	10%			$225,400
	Technical Support	15%			$338,000
				TOTAL CAPITAL COST	**$2,817,000**
ANNUAL COSTS - Year 1					
All annual costs include GAC replacement					
Description		**Qty**	**Unit**	**Unit Cost**	**Total Cost**
O&M Costs 0-1		1	LS	$651,600	$651,600
Hot air injection O&M		1	LS	$32,300	$32,300
				SUBTOTAL	$683,900
	Contingency (scope and bid)	20%			$136,800
				SUBTOTAL	$820,700
	Construction Management	10%			$82,100
	Engineering	15%			$123,100
				TOTAL O&M COST year 1	**$1,025,900**
ANNUAL COSTS - Years 2 Thru 5					
Description		**Qty**	**Unit**	**Unit Cost**	**Total Cost**
O&M Costs 2-5		1	Years	$540,400	$540,400
Hot air injection O&M		1	LS	$32,300	$32,300
				SUBTOTAL	$572,700
	Contingency (scope and bid)	20%			$114,500
				SUBTOTAL	$687,200
	Construction Management	10%			$68,700
	Engineering	15%			$103,100
				TOTAL O&M COST years 2-5	**$859,000**
PERIODIC COST - Year 5					
Description		**Qty**	**Unit**	**Unit Cost**	**Total Cost**
Institutional Controls Package Updates		1	LS	$9,200	$9,200
				SUBTOTAL	$9,200
	Contingency (scope and bid)	20%			$1,800
				SUBTOTAL	$11,000
	Project Management	10%			$1,100
	Technical Support	15%			$1,700
				TOTAL PERIODIC COSTS	**$13,800**

PRESENT VALUE ANALYSIS				
COST TYPE	**YEAR(S)**	**TOTAL COST PER YEAR**	**DISCOUNT FACTOR (7%)****	**PRESENT VALUE**
Capital Costs	0	$2,817,000	1	$2,817,000
Annual Costs	1	$1,025,900	0 935	$958,800
	2- 5	$859,000	3 166	$2,719,300
Periodic Costs	5	$13,800	0 713	$9,839
		TOTAL PRESENT VALUE OF ALTERNATIVE 2		**$6,500,000**

Notes

*All cost backup reference sheets are presented in Appendix A of the Omega FS

** 7 % discount factors, based on OMB guidance, are taken from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study"

DPE Contingency Capital Cost	$1,074,800
DPE Contingency O&M Cost	$449,800

TABLE 12
Summary of Cleanup Levels
Omega Chemical Superfund Site

Primary Contaminants of Concern	Cleanup Levels* Soil Gas (µg/m^3)	Indoor Air (µg/m^3)	Soil (mg/kg)
1,1,1-Trichloroethane	1.30E+06	1800	
1,1-Dichloroethene	1.10E+05	88	
1,2-Dichloroethane	83	0.74	
cis-1,2-Dichloroethene	2.20E+04	29	
Tetrachloroethene	470	0.33	1.2
trans-1,2-Dichloroethene	4.50E+04	58	
Trichloroethene	1300	0.96	
Trichlorofluoromethane (Freon11)	3.90E+05	310	

Explanation:

Cancer risk at the cleanup level is 1×10^{-6}

Basis for cleanup level is HHRA residential exposure scenario.

*The COC concentrations in soil that are protective of the highest beneficial use of groundwater at OU-1 will be determined during Remedial Design, using a one-dimensional modeling software, such as the EPA VFLUX model (DiGiulio and Varadhan, 2001) or similar software.

TABLE 13
Matrix of Cost and Effectiveness Data
Omega Chemical Superfund Site

Alternative	Cost Effective (Y/N)	Present Worth Cost	Incremental Cost	Long-Term Effectiveness and Permanence	Reduction of TMV Through Treatment	Short-Term Effectiveness
1 No Action	Y	$0	$0	-No reduction in long-term risk to human health and the environment	-No reduction of toxicity -No reduction of mobility -No reduction of volume	-No reduction in short-term risk to human health and the environment
2 SVE/Partial Capping/ICs	Y	$5 6M $0 9M[a] $2 9M[b]		-Expected to fully achieve RAOs and meet cleanup levels -ICs are expected to be reliable and adequate	-Contaminants would be permanently removed from OU-1 via the vapor treatment process	-Would begin reducing contaminant soil concentrations upon startup -Soil vapors that evaporate from residual contamination might rebound to levels that would require pulsed operation of the SVE system for an additional six months -Once operational, would require five years to achieve cleanup levels
3 Hot Spot Excavation/SVE/Partial Capping/ICs	N	$8 6M $0 9M[a] $2 9M[b]		-Expected to fully achieve RAOs and meet cleanup levels -ICs are expected to be reliable and adequate	-Contaminants would be permanently removed from OU-1 via the vapor treatment process -Would also remove contaminants from OU-1 via excavation, offsite ex situ treatment and offsite disposal	-Would begin reducing contaminant soil concentrations upon startup -Soil vapors that evaporate from residual contamination might rebound to levels that would require pulsed operation of the SVE system for an additional six months -Once operational, would require five years to achieve cleanup levels
4 Thermally Enhanced SVE/Partial Capping/ICs	N	$16 0M		-Expected to fully achieve RAOs and meet cleanup levels -ICs are expected to be reliable and adequate	-Contaminants would be permanently removed from OU-1 via the vapor treatment process	-Would begin reducing contaminant soil concentrations upon startup -Soil vapors that evaporate from residual contamination might rebound to levels that would require pulsed operation of the SVE system for an additional six months -Would have the greatest potential for producing fugitive dust emissions -Once operational, would require one year to achieve cleanup levels

Notes:

[a] - Present worth cost for contingency hot air injection

[b] - Present worth cost for contingency dual phase extraction

Figures

Aerial Date: March 2004, USGS

Legend

Freeway

River/Stream

N

0 0.5 1 Miles

Figure 1
Facility Location Map
Omega Chemical Corporation Superfund Site

Date: 8/20/2008

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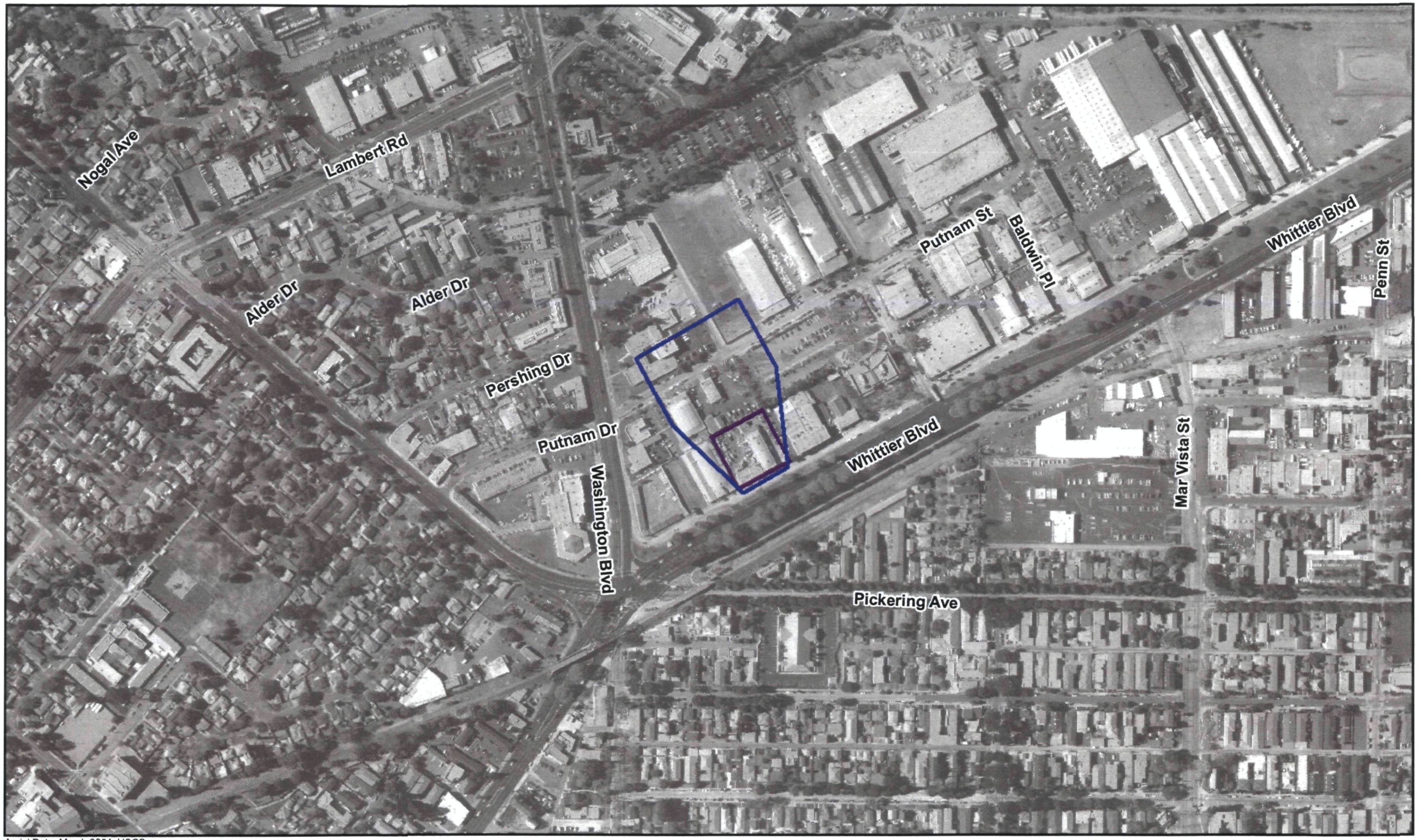

Aerial Date: March 2004, USGS

Legend

Former Omega Chemical Property

OU-1 Boundary

N

0 500 Feet

Figure 2
OU-1 Location Map
Omega Chemical Corporation Superfund Site

Date: 8/20/2008

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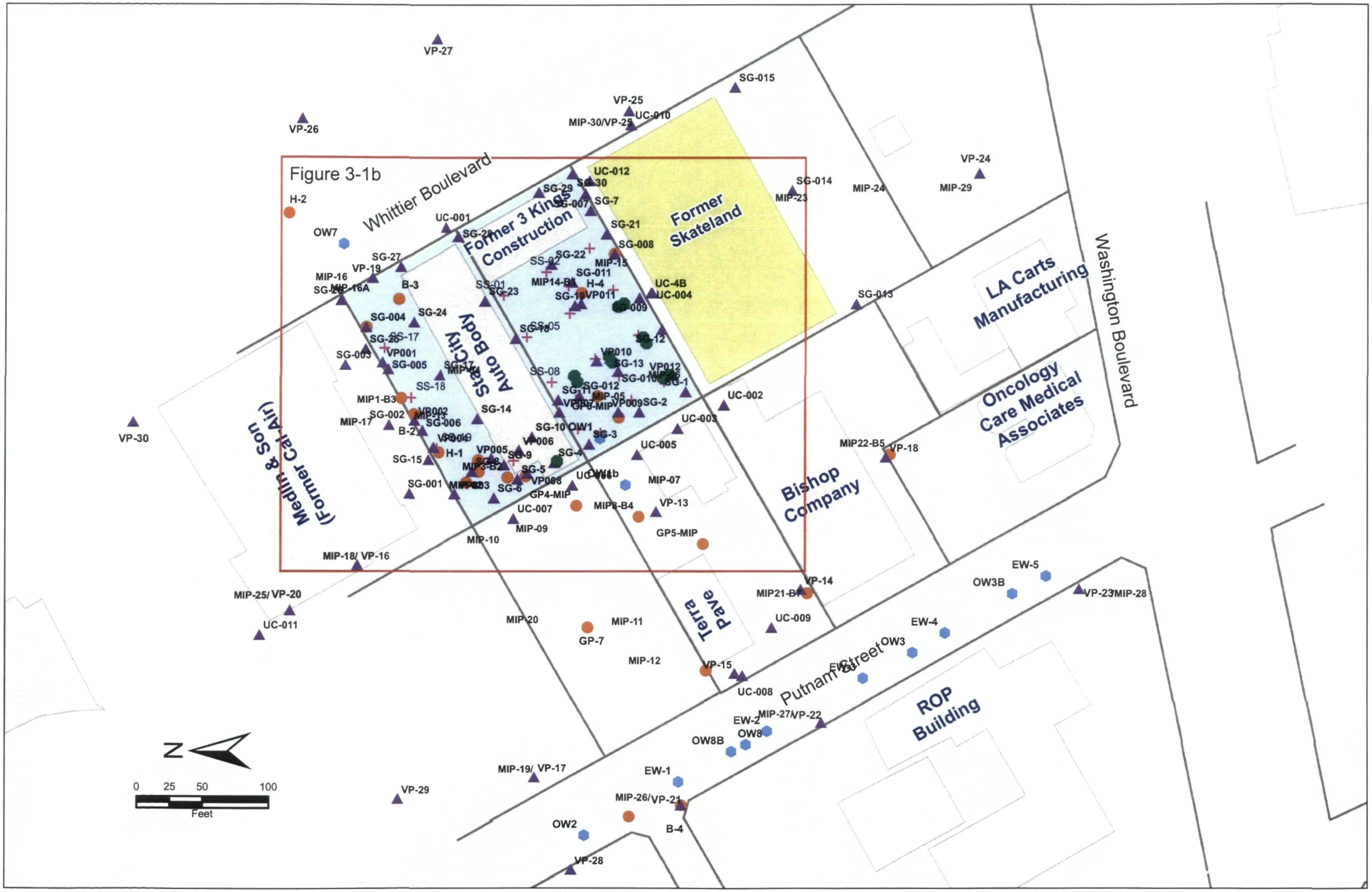


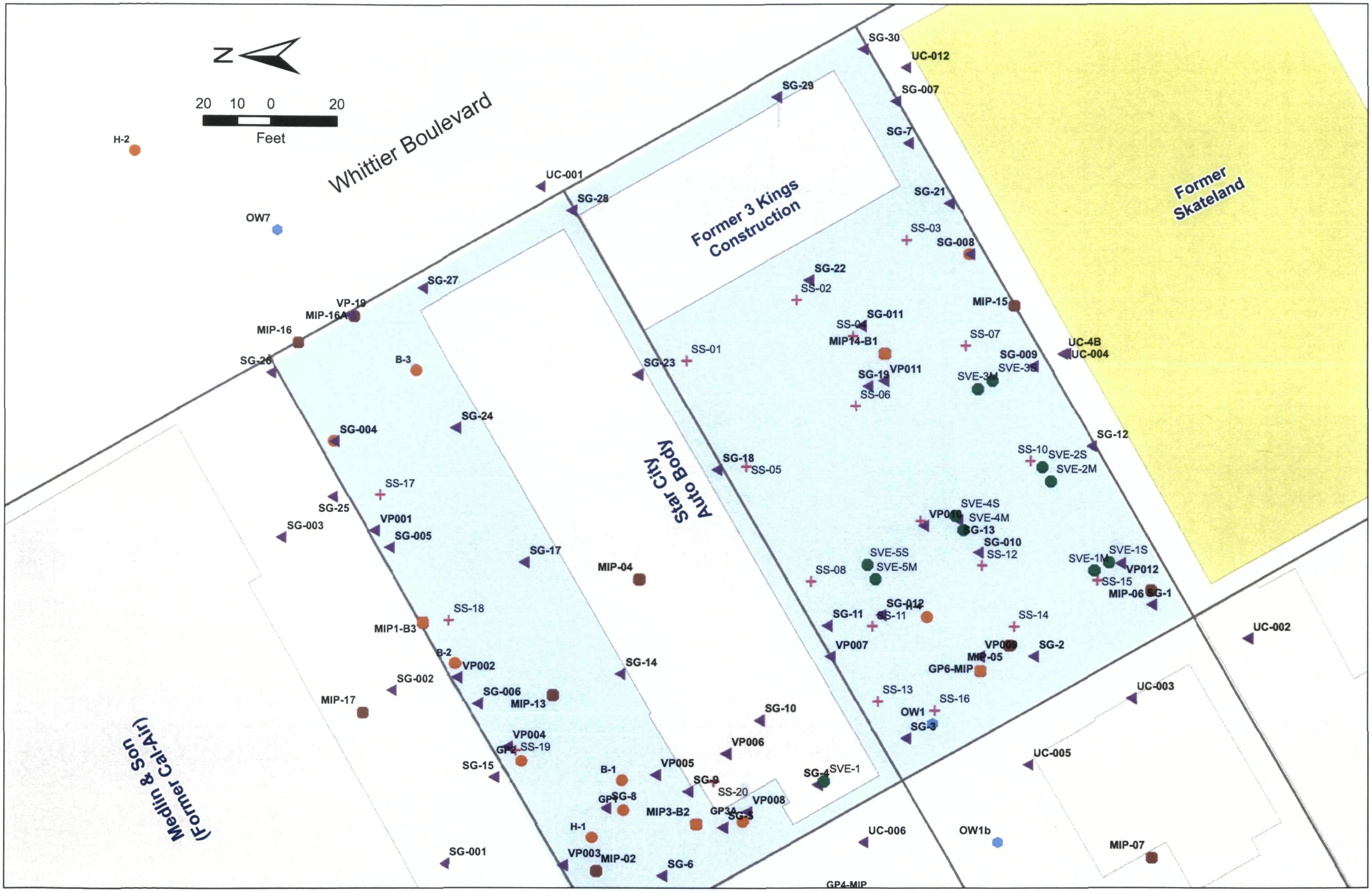
Legend

Property Boundary
Former Omega Chemical Property
Existing Building
Former Building

Surface Soil Sample Location
Subsurface Soil Sample Location
Soil Vapor Sample Location

Membrane Interface Probe (MIP)
SoilVaporExtractionWells
Groundwater Well Location

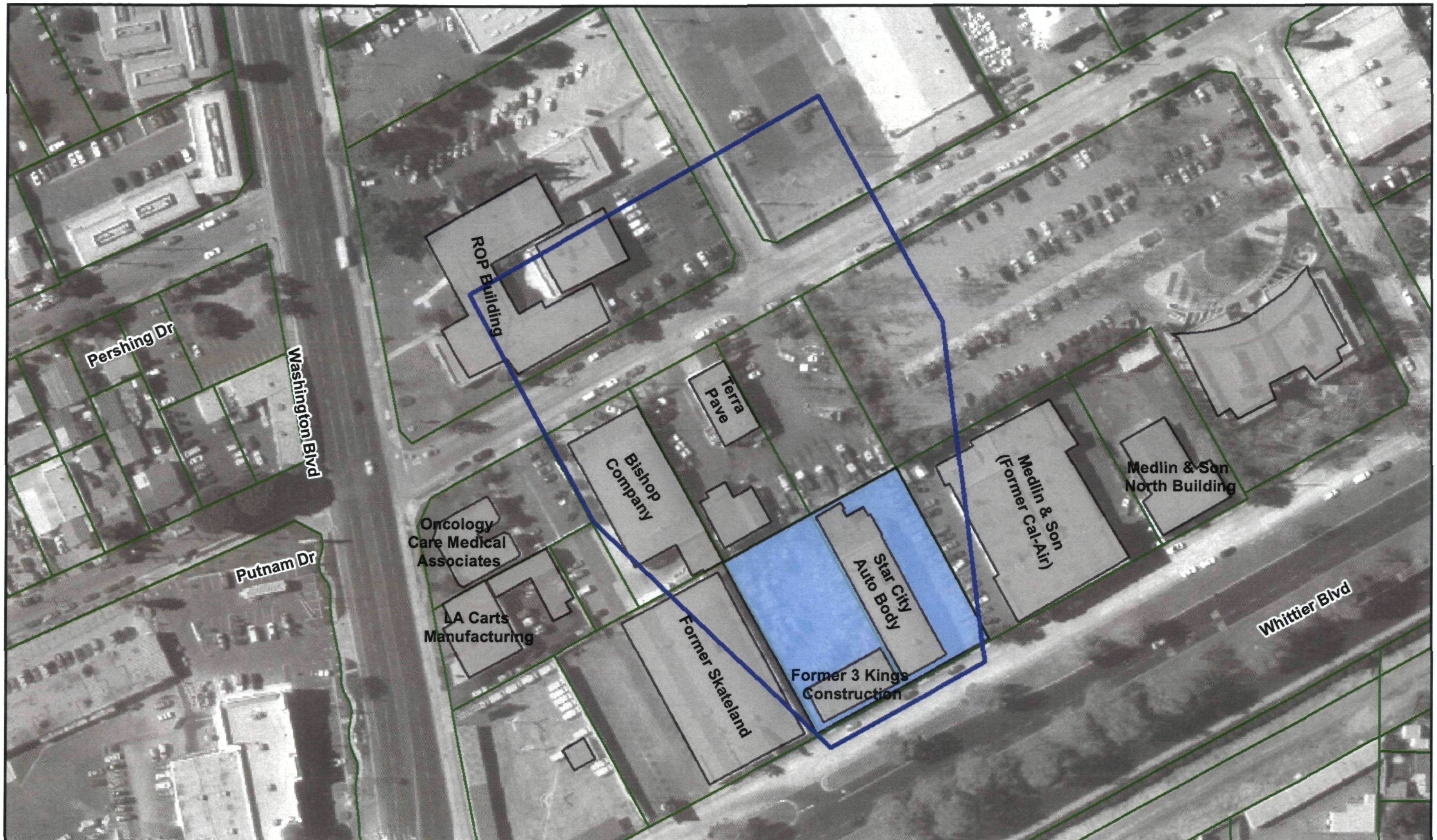
FIGURE 3
Sampling Locations
Omega Chemical Superfund Site



Legend

- Property Boundary
- Former Omega Chemical Property
- Existing Building
- Former Building
- Surface Soil Sample Location
- Subsurface Soil Sample Location
- Soil Vapor Sample Location
- Membrane Interface Probe (MIP)
- SoilVaporExtractionWells
- Groundwater Well Location

FIGURE 4
Sampling Locations (Inset)
Omega Chemical Superfund Site



Aerial Date: March 2004, USGS

Legend

- Property Boundary
- OU-1 Boundary
- Existing Building
- Former Omega Property

N

0 150 Feet

Figure 5
OU-1 and Vicinity Map
Omega Chemical Superfund Site

Date: 8/15/2008

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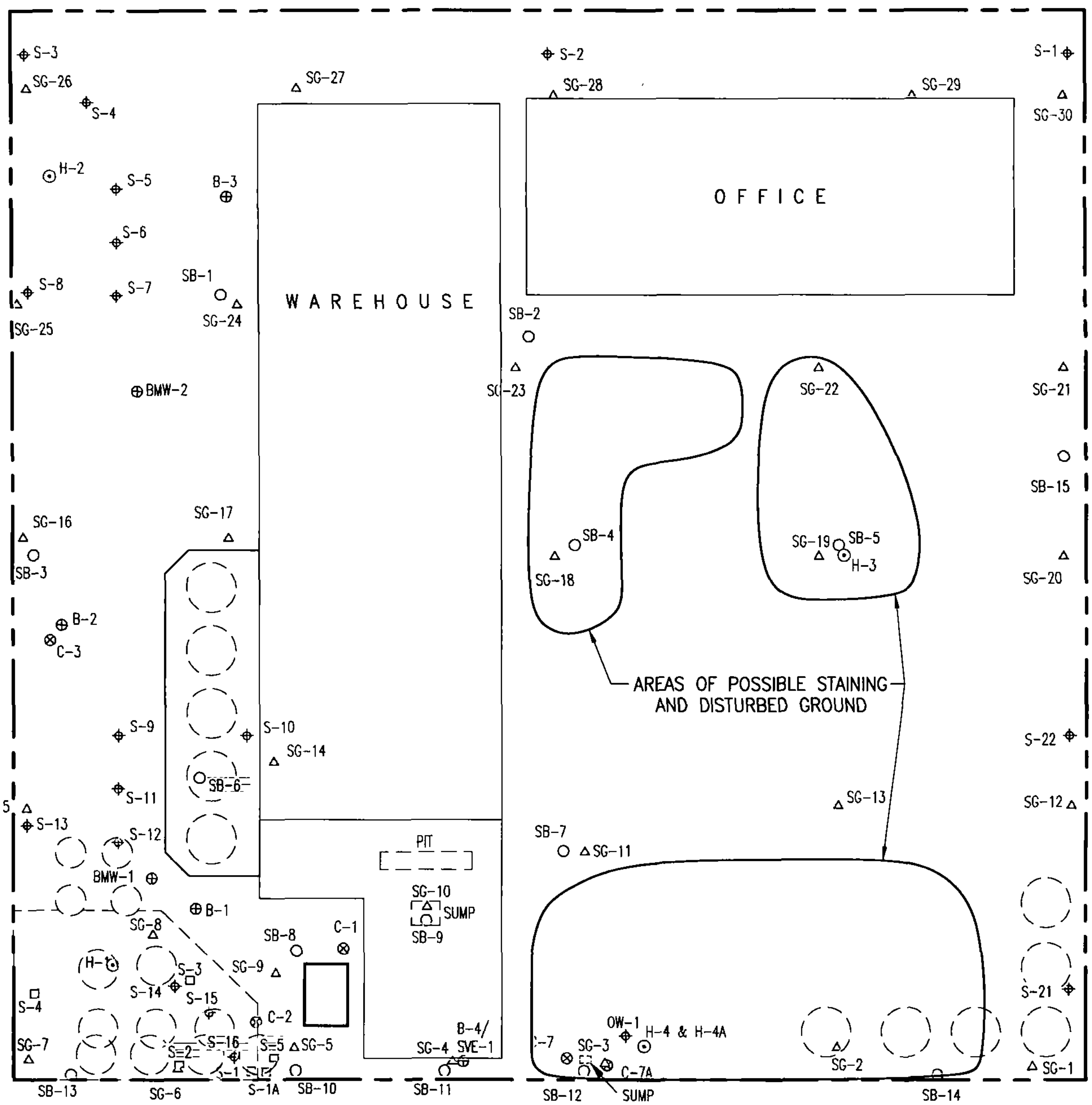


LEGEND

- □ Leroy Crandall Soil Boring (1985)
- ○ ENSR Soil Boring (1988)
- ⊕ ENSR Groundwater Monitoring Well (1988)
- ○ England/Hargis Soil Boring (January 1996)
- △ England/Hargis Soil Gas Sample (December 1995)
- ⌖ England/Hargis Monitoring Well (June 1996)
- ⊙ England/Hargis Hydropunch (March 1996)
- ⊗ England/Hargis Soil Boring (March 1996)
- ⌖ ERT Soil Gas Sample (1988)
- ◌ Feature Removed

Fomer 500 Gallon UST Location

N

1" = 30'

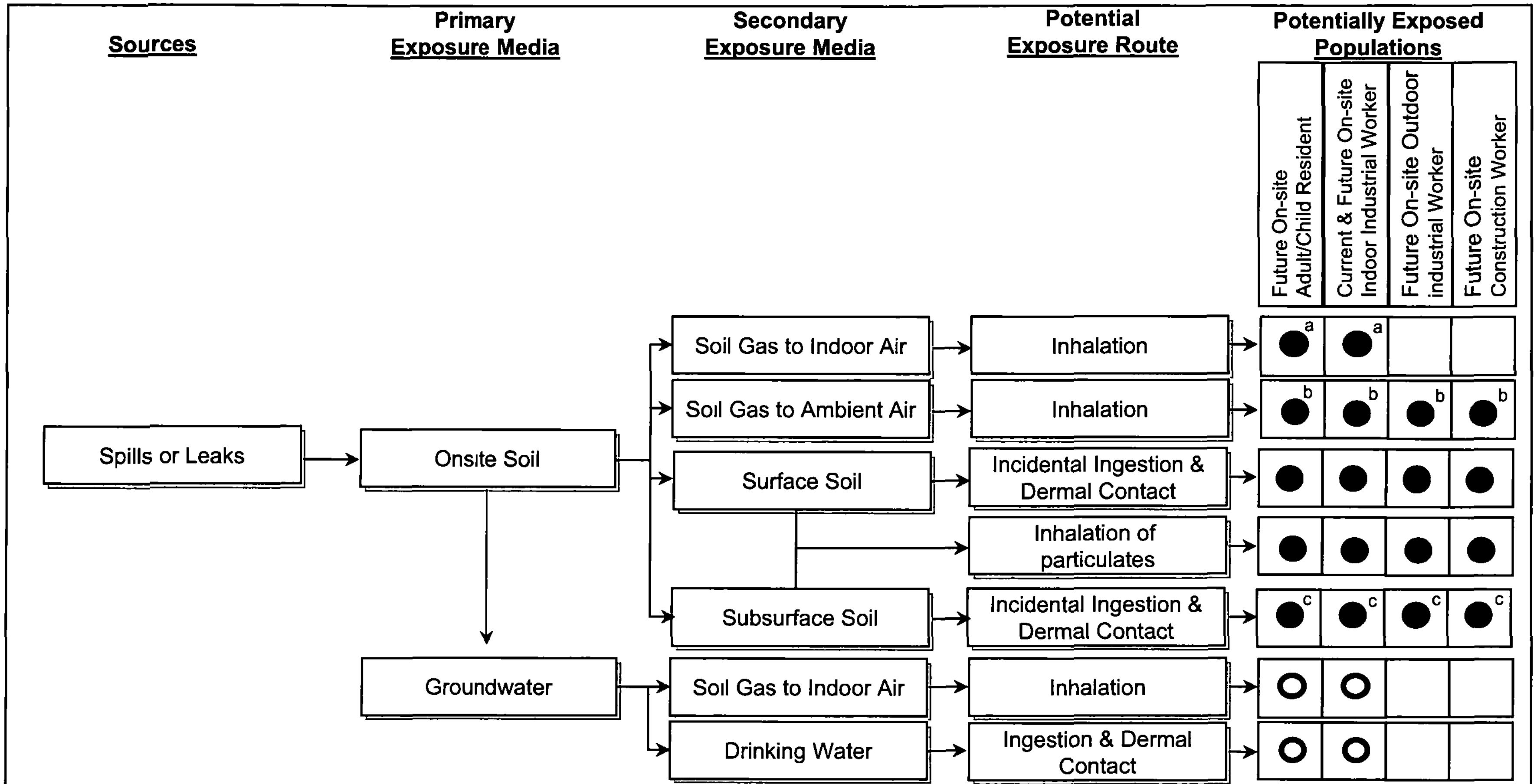
15 0 30

Note: All locations approximate

FIGURE 6
Potential Source Areas and
Historic Sample Locations
Omega Chemical Corporation Superfund Site

FIGURE 7
Soil Concentration Distribution for PCE
Omega Chemical Superfund Site

FIGURE 8
Soil Vapor Concentration Distribution for PCE
Omega Chemical Superfund Site



a – Indoor air is evaluated using measured indoor air concentrations for current scenarios For future scenarios, indoor air is evaluated using soil gas data modeled to provide indoor air concentrations

b – Ambient air is evaluated using measured ambient air concentrations for current scenarios For future scenarios, ambient air is evaluated using soil gas data modeled to provide ambient air concentrations

c – Future residents, industrial workers, and construction Workers will be evaluated using the top 12 feet of the soil column

FIGURE 9
Site Conceptual Exposure Model
Omega Chemical Corporation Superfund Site

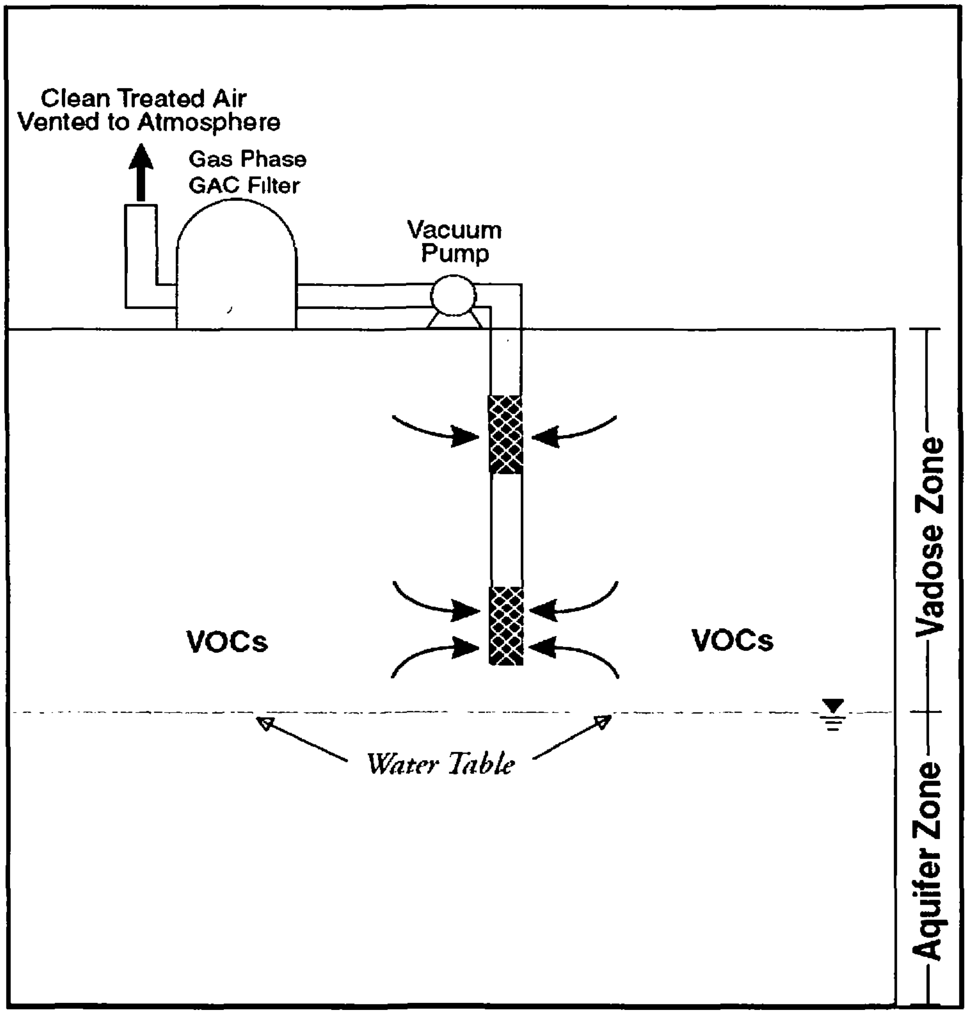


Figure 10
Components of SVE System
Omega Chemical Corporation Superfund Site